

臺灣植物鼠絲

第四卷

Icones Plantarum Formosanarum

nec non et

Contributiones ad Floram Formosanam.

or,

Icones of the Plants of Formosa, and Materials for a Flora of the Island, based on a Study of the Collections of the Botanical Survey of the Government of Formosa.

By

B. Hayata, Rigakuhakushi.

VOLUME IV.

Published by the Bureau of Productive Industries,

Covernment of Formosa,

TAIHOKU.





THE THE PARTY OF T

NOTICE

- I. Dicotyledons—Polypetalous: Ranunculaceæ—Rosaceæ. Published September 10th, 1911.
- II. 1. Conspectus of the Flora of Formosa, Saxifrageæ—Dipsaceæ.
 - 2. New or Noteworthy Plants of Formosa. Published October 15th, 1912.
- III. 1. Contributions to the Flora of Formosa, I.
 - On the Systematic Position of Mitrastemon, as a Genus representing a special Tribus of the Raffleciaceæ. Published December 25th, 1913.
- IV. Contributions to the Flora of Formosa, II. Published November 25th, 1914.
- V. will be issued in September 1915.





ICONES PLANTARUM FORMOSANARUM

NEC NON ET

CONTRIBUTIONES AD FLORAM FORMOSANAM.

IV.

AUCTORE

B. Hayata.



. East assatic lib.

7624.8 0040 v.4

TO HIS EXCELLENCY COUNT SAMATA SAKUMA,

GOVERNOR GENERAL OF FORMOSA.

SIR.

I have the honour to submit to your Excellency the fourth volume of the Icones Plantarum Formosanarum, nec non et Contributiones ad Floram Formosanam by B. HAYATA, D. Sc.

KAKICHI UCHIDA,

CIVIL GOVERNOR OF FORMOSA.

September 1, 1914, Taihoku.



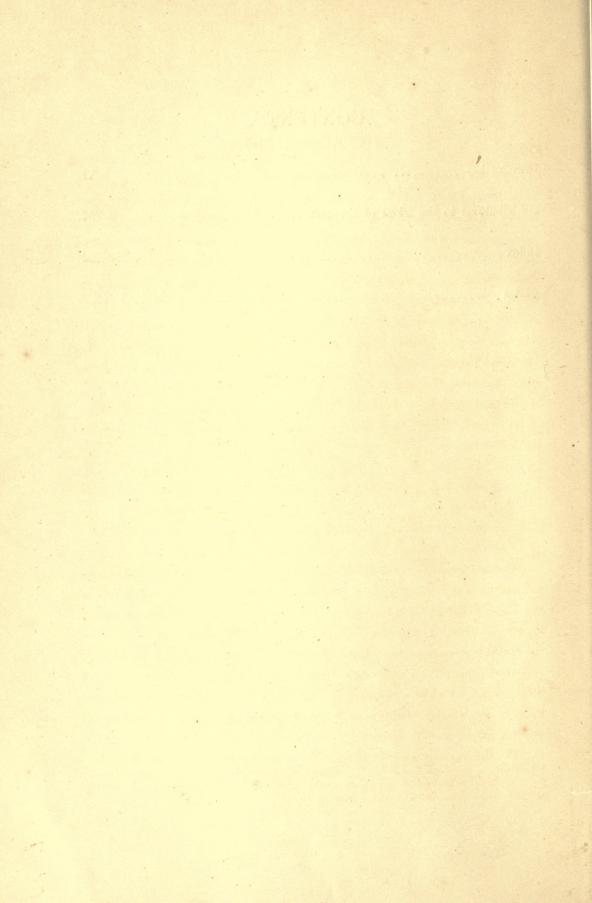
The same the same of the same

PERSONAL PROPERTY.

S. Aadem Day a primary made

CONTENTS.

Introduction	I–VI.
Contributions to the Flora of Formosa	1-257.
Index	259-264
Plates	I-XXV



INTRODUCTION.

As was stated in the third volume of this work, several more volumes were to be devoted to the results of studies of new materials which were then on my hands. The first part of these studies was published in Vol. III. under the heading, "Contributions to the Flora of Formosa, Part I." The present volume is principally devoted to the second part of the same studies. It also contains some plants collected during my last excursion to Formosa, in the spring of this year.

The volume contains 285 species and several varieties, of which 167 are proposed as new species, and 9 as new varieties of known species, while 118 are identified with species which were known from the island or from other countries. Of genera contained in this volume, one genus, *Arisanorchis*, is proposed as new, and thirteen genera are mentioned as new to the flora of the island. The genera new to our knowledge of the flora are shown in the following list.

Aconitum	Moneses	Cryptostylis
Ailanthus	Boschniakia	Cystopteris
Corylopsis	Beilschmiedia	Leucostegia
Modecca	Hydrocharis	
Cornus	Arisanorchis	

Genera,* species* and varieties* now to be added to the flora of Formosa number as many as 13 genera, 194 species and 9 varieties. Thus, up to the present date, the total number of species of the flora, so far as is known, is 3112, belonging to 891 genera and 158 families.

In the present volume, floral sketches of some of my species already described are given, and the original descriptions are repeated, as I desire to give a clear conception of my species to any one who examines them to see whether they are to be recognized as genuine new species or to be reduced to known species.

Of the species mentioned in this work, I have proposed more than

^{*} It should be understood that plants outside of the island are not counted in this number, although they are mentioned in this volume.

half as new. In so doing, I shall be accused of having described too many new species, and shall be censured for having paid but little attention to known species. But such is not at all the case. I have, as far as necessary, consulted all accessible literature bearing on my work, and have made exhaustive comparisons with all the herbarium specimens preserved in our institutes at Taihoku and Tōkyō. It should be understood, as I stated in my former paper,* that our herbaria are as yet very inadequate for the working up of my materials which are really extensive. It frequently occurs with us that foreign herbarium specimens for comparison being very scanty, we are compelled to consult original or reproduced descriptions, instead of herbarium specimens themselves.

In this way have my own investigations been made. I have commenced my work with the utmost care, examining all descriptions of the species with which my plants might be identified. In those cases in which the descriptions of plants under examination were exhaustive or at least available for identification, the work could be carried on with some measure of satisfaction. Much more satisfactory has it been when they were accompanied with figures. When, however, the descriptions were very short and imperfect and not accompanied with any figures, the work of identification was utterly disappointing if not impossible. In cases where I could not satisfactorily identify my plants with any known species in consequence of the imperfection of the given descriptions or the want of herbarium specimens, the only work that was possible for me was to describe my plants fully and accurately as new species, giving their affinities. This has been most frequently the case with ferns. As stated by Sir William Hooker,** the identification of ferns with given descriptions is a very difficult task, and in some cases utterly impossible, if the descriptions are not accompanied with figures.

For us to whom comparison with herbarium specimens can be but imperfectly carried out, the most important work to be undertaken is not so much the identification of plants with known species, as the study of their

^{*} НАУАТА, В.—Materials for a Flora of Formosa, in Journ. Coll. Sci. Imp. Univ. Tōkyō, XXX-1, p. 2.

^{**} HOOKER, Sir WILLIAM JACKSON. - A second Century of Ferns (1861), p. VII.

characters and affinities. Works which contain full descriptions and illustrations of plants of the regions in question, should present important materials for students of phytogeography and of systematic botany. Works which deal only with the names of plants, perhaps erroneously classified, as would probably be the case in circumstances like ours, would be likely to lead students of phytogeography to erroneous results, and would puzzle students of systematic botany with an endless confusion of nomenclature of plants.

In this work, plants, the identification of which has been satisfactorily made, are referred to known species. In this case, I usually have made it clear how I have identified them with the species to which they have been referred,—by means of a comparison of herbarium specimens, of figures or of descriptions found in literature. But in cases in which identification has not been satisfactorily made, plants have been described as new with affinities. In some cases, my species may be the same as those which I have given as their allies under descriptions of plants in question. Therefore, though many of my new species should be reduced to synonyms, still I have little doubt that my work will present important material to students of the flora of Eastern countries. No one is more conscious than I that errors may have crept into my work; but the errors in most cases are of a nature inevitable in work of this kind done in the East, far from Western herbaria, and will doubtless easily detected by those who are familiar with the species, when they see merely my descriptions and figures without troubling themselves to look at my original types.

As stated above, nothing is more difficult than to identify plants by short descriptions unaccompanied with figures. Original descriptions ought, therefore, to be very clear, accurate and exhaustive, and if possible, ought to be supplemented with figures, so that one can identify one's plants easily and satisfactorily. For one to whom original types are easily accessible, it is not difficult to work with short descriptions, as one may go to see the types themselves, if one finds original descriptions unavailable for identification. But, for one to whom original types are not accessible, when descriptions are too short for use, the work cannot but be very difficult and

sometimes impossible. Exhaustive descriptions are, therefore, indespensable for us to whom herbarium specimens for comparison are not sufficient and types are practically inaccessible.

Descriptions of new species ought to be accessible to all botanists and are necessary, except in the case of those of certain circulation of which types are at hand. Moreover, type-specimens are not things which can be widely distributed; they may be rare, or even extinct. Descriptions, however, when published, can be easily obtained, and the excuse of inaccessibility is not admissible. Accordingly, original descriptions should be so exhaustive that they may be substitutes for type-specimens and that one can work with descriptions in cases where the types are not available. In this sense, Eastern botanists are in no more urgent need of exhaustive descriptions of plants of which types are preserved in Western herbaria, than Western botanists are of those of which types are preserved in Eastern herbaria. The same can be said of all botanists either with reference to different countries or to different herbaria. It is also much to be desired that the multiplication of type-specimens proposed by Swingel* should be carried out by all botanists who have to describe new species. Though the distribution of merotypes is most important for taxonomic botany, yet it is far too difficult, and in some cases impracticable, to make it obligatory on all authors of new species.

Descriptions might be very short so long as the species belonging to the same genus were few in number. As the species increase year after year through the exploration of new territories or other causes, descriptions will tend to become fuller and more exhaustive. In such cases, original descriptions of two or three lines only for the sake of priority should be absolutely avoided.

It is much to be desired that the following resolutions should be considered at the next meeting of the International Botanical Congress to be held in London next year, if the present overwhelming war is then over, viz: (1), that in the case of new species, descriptions of two or three lines only for the sake of priority should be as far as possible avoided; (2), that authors who are compelled to describe new species from imperfect

^{*} SWINGLE, W. T.—Merotypes as means of multiplying botanical types.

specimens should supplement their original descriptions with perfect materials as soon as possible.

As this volume is principally devoted to studies of the Orchideæ and Pteridophyta, a few remarks on the classification upon which the two families is based will not be out of place. In working up my collections of orchids, I have principally followed Bentham and Hooker, sometimes Lindley, KING and PANTLING, and PFITZER. As to the classification of Monandræ-Acrotonæ, many authorities do not agree. *Pfitzer's system which, taking into account whether the inflorescence is terminal or lateral, distinguishes Acranthæ and Pleuranthæ, or, on the basis of the vernation of the leaves being either convolutive or duplicative, makes many divisions in the above named tribes, proved to be impracticable in working up my materials. Moreover, I have found many doubtful cases, so far as inflorescence being terminal or lateral is concerned, and there are even more cases in which it is impossible to determine whether the vernation of the leaves is duplicative or convolutive. King and Pantling's Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. Vol. VIII. and several other illustrations given in the same Annals have been very useful to me in identifying and comparing my collections of orchids.

As to ferns and especially to the genus, *Dryopteris*, I have followed C. Christensen's system in his Index Filicum. His classification of the subgenera of the genus** is based principally on the presence or absence of hairs and on their structures. This newly founded system is certainly one of the most natural arrangements and has proved to be easily applicable to Formosan ferns. But, as far as Japanese and Formosan species are concerned, there are a few cases in which I can scarcely agree with the author. Some species which are taken by him as types of a subgenus do not show the characters of the same subgenus, after the delimitation of the latter as stated by him. For example, *Dryopteris Miqueliana* (Max.) C. Ch. which is taken as one of types of the subgenus, *Eudryopteris*, which after Christen-

^{*} PFITZER, E.—Orchidaceae in Engler u. Prantl, nat. Pfl.—fam. II-6, p. 76.

^{**} Christensen, C.—On a natural classification of the species of *Dryopteris*, pp. 74-76, and a monograph of the genus *Dryopteris* part-1, pp. 61-63.

SEN'S delimitation should have no true hair, has true unicellular hair; while D. Sieboldii (van Houtte) O. Ktze, which is taken as another type of the same subgenus, has true multi-cellular hair. I have no doubt, however, that the two just referred to could be quite naturally assigned to the subgenus named, as might be seen from their general characters. With a very few exceptions, his delimitation of subgenera and classification of the genus are very natural, and I have, therefore, followed his system solely.

As to my new species mentioned in this volume, I have described them as accurately and fully as possible and in almost all cases, save where the number of pages or the want of materials forbade, I have supplemented them with figures, in plates or in the text. Accordingly, I believe that any one who is familiar with the plants in question can at once decide whether my species should be recognized, or should be reduced, without taking the trouble to look at my types. As to ferns, I have added to full descriptions photographs of whole forms and magnified sketches of pinnæ or pinnules, scales and sori. As a type for description, I have taken the largest form possible; for describing pinnæ or pinnules, I have taken basal ones; and for angles of pinnæ, I have taken the middle ones. Great attention has been paid to venation and the structure of hairs.

All the species of phanerogamous plants are here arranged, as in the preceding volumes, after the system of Bentham and Hooker, while those of vascular cryptogamia are arranged after the system of Engler and Prantl. The scope of the present volume is the same as that of the preceding volume.

In conclusion, I avail myself of this opportunity to tender my hearty thanks to the officials of the Government of Formosa to whom I am much indebted for help in the collection of materials and in the publication of this work.

B. HAYATA.

August 31, 1914, Taihoku and Tōkyō.



Contributions to the Flora of Formosa.

II.

Ranunculaceæ.

Aconitum LINN.

Aconitum Fukutomei Hayata sp. nov. Caulis non visus. Ramuli flexuosi subcomplanati læves tenuiter hirsuti (pilis patentibus). Folia radicalia ignota. Folia in ramulo tripartita breve petiolata vel 3-foliolata, foliolis subæqualibus, terminali in circumscriptione obovato-lanceolato 31 cm. longo 1½ cm. lato apice acuminato basi cuneato ad petiolulum 2-3 mm. longum abeunti margine laciniato, (laciniis linearibus 1-\frac{1}{3} cm. longis 2\frac{1}{3}-2 mm. latis), foliolis basilaribus laciniatis, utraque pagine hirsuta, nervis venisque supra impressis subtus elevatis, petiolis communibus 8 mm. longis. Flores versus apicem ramulorum racemosim dispositi vel ad axillas foliorun superiorum solitarii subnutantes, pedicellis 21 cm. longis hirsutis sursum bracteis 2 alternis instructis, bracteis linearibus 5 mm. longis; flores violacei, a basi sepali antici usque ad apicem galeæ 3 cm. longi. Sepalum posticum galeæforme 22 mm. longum 1 cm. latum et profundum dorso rotundato-convexum intus extusque hirsutum apice breve cuspidatum, cuspide triangulari obtusa reflexa, basi subcuneato-contractum; sepala lateralia late rotundato-flabelliformia 14 mm. longa totiusque lata apice late rotundata basi arcuato-cuneata latere superiore interiore arcuata, latere inferiore exteriore arcuata ad basin 2 mm. latam truncata, utraque pagine hirsuta erecta prope apicem margine exteriore recurva cætera plana; sepala antica ovato-oblonga vel obovato-oblonga 13 mm. longa 5-6 mm. lata apice obtusa vel cuspidato-acuta ad summum semper obtusa basi subito breveque cuneato-contracta utraque hirsuta ad basin 1 mm. lata margine tenuiter interiore recurva. Petala superiora 2, *λ*-formia longe unguiculata apice cucullata sub galea recondita, unguibus linearibus 9 mm. longis 1 mm. latis intus profunde sulcatis hirsutis vel subbarbatis (pilis patentibus) basi ~-formiter recurvis subcomplanatis, cucullis?-formibus 9 mm. longis 1-2 mm. latis apice recurvis deorsum longe



linearibus basi \pm dilatatis ad extremitatem brevissime 2-lobis vel retusis tenuiter barbatis; petala 3 inferiora minima angustissime linearia 3 mm. longa $\frac{1}{3}$ mm. lata apice obtusa basi haud contracta subglabra vel tenuiter barbata enervia. Stamina ∞ glabra, filamentis exteriore recurvis 5-6 mm. longis a medio usque ad basin alatis, partibus alatis 3 mm. longis cum alis 1 mm. latis apice sagittatis vel gradatim ad partem exalatam abeuntibus, antheris reniformibus 1 mm. latis minus 1 mm. longis utrinque emarginatis. Carpella distincta pauca circ. 3 fusiforme linearia \pm obliqua cum stylo $4\frac{1}{2}$ mm. longa glabra.

HAB. Mt. Kiraishuzan, leg. K. Fukutomé, Oct. 1913.

As the specimen is rather imperfect, exact determination is not possible. It should be comparable to some extent to A. sachalinense F. Schmidt in the linearly parted or laciniate leaves and in the size and hairly form of the flowers; but the new species is widely different from the congener in having glabrous filaments and more opened dorsal sepals.

Ternstræmiaceæ.

Actinidia LINDL.

Actinidia callosa Lindl. var. formosana Finer et Gagn. Fl. As. Or. II. (1907) p. 20.

Actinidia Championi Hayata in Herb. Bot. Gard. Tōkyō (non Benth). Hab. Mt. Taiton, leg. G. Nakahara, Aug. 1905, (No. 262-A). Determined by Mr. W. R. Price at Kew.

Malvaceæ.

Gossypium Linn.

Gossypium hirsutum var. religiosum WATT.

HAB. Shizangan, leg. T. MAKINO, Nov. 1896.

Determined by Mr. Sprague at Kew, through Mr. W. R. PRICE.

Simarubeæ.

Ailanthus Dese.

Ailanthus glandulosa Desf. var. Tanakai Hayata n. v. Arbor? Folia (in specimine nostro singulo) 55 cm. longa 26 cm. lata in circumscrip-

RHAMNEÆ. 3

tione oblonga 27-foliolata, foliolis suboppositis, jugis 31-4 cm. remotis, iuferioribus majoribus obliquis ovato-oblongis 13 cm. longis 5½ cm. latis apice subito acuminatis, (acuminibis linearibis) basi obliquis latere interiore latioribus 3 cm. latis latere exteriore 2 cm. latis, basi in latere interiore truncatis, ad angulum partis truncatæ glandulis 1-2 instructis, basi in latere exteriore acutis vel cuneato-acutis ad angulum partis acutæ glandulis 1 instructis, chartaceis, utraque pagine glaberrimis supra ad costas impresso-sulcatis, costis versus sulcos distincte graciliter elevatis, venis lateralibus utroque latere costæ 10-11, mediis a costa augulo 50° egressis supra tenuiter impressis vel planis, costis venisque subtus distincte sed graciliter elevatis, venulis minute reticulatis, subtus subglaucis vel pallidis, margine integris; glandulis utroque latere margine 1-2 complanato-globosis 1 mm. in diametro supra planis subtus prominente elevatis ad centrum depressis, petiolulis 2-2½ cm. longis subteretibus basi subito dilatatis, petiolis 12 cm. longis subteretibus basi ± dilatatis. Flores ignoti. Paniculæ fructiferæ cymosæ 25 cm. longæ 30 cm. latæ, pedicellis ultimis gracilibus 2-1 cm. longis. Samera generaliter una in receptaculo singulo sed interdum 2 lineari-oblonga ± obliqua apice obtusissima sursum ± tortuosa basi oblique obtusa latere raphæ acuta, latere opposito obtusissima vel rotundata, venoso-reticulata 1-sperma, semine ad centrum sito.

Hab. Tōyenchō: Shibutsuke, in montibus 3000 ped. alt., leg. I. Tanaka, Nov. 1913.

Very near the type; but differs from it in the quite glabrous leaves and in the samaræ which in this new variety are broader and usually convexed at the margin on both sides at the base, while in the type they are convex on one side, but concave on the other.

Rhamneæ.

Rhamnus LINN.

Rhamnus acuminatifolia Hayata Ic. Pl. Formos. III. p. 62. Descriptio auctata: Flores subumbellati 9–10–florati, pedunculis semper solitariis axillaribus 1–½ cm. longis hirsutis apice cicatricibus pedicellorum 5–6 notatis, cicatricibus rotundatis cupulæformibus ad centrum depressis, pedicellis cum pedunculo articulatis ad apicem pedunculi radiatim dispositis 4 mm. longis

hirsutis apice ad cupulas calycium expansis. Cupula calycis late campanulata 1 mm. longa 2 mm. lata extus hirsuta intus glabra discis flavis obtecta. Lobi calycis valvati triangulares 2 mm. longi $1_{\frac{1}{4}}$ mm. lati apice triangulari-obtusi extus subglabri plani intus glabri sursum prominente deorsum tenuiter costati post anthesin a cupula decidui. Petala late obovata cum sepalis alterna valde concava minus 1 mm. longa $\frac{2}{3}$ mm. lata apice 2-lobata basi unguiculata $\frac{1}{10}$ mm. longa glabra. Stamina 5, cum petalis opposita minuta cum filamentis 1 mm. longa, filamentis $\frac{1}{10}$ mm. longis, antheris ovatis $\frac{4}{5}$ mm. longis apice connectivis mucroniforme productis. Ovarium late ovatorotundatum 1 mm. longum, stylo validiusculo columniformi $\frac{2}{3}$ mm. longo apice brevissime 3-lobato.

Hab. Ritōzan, ad 6500 ped. alt., leg. T. Kawakami, Juli. 1913, (No. 9).

Leguminosæ.

Acacia Willd.

Acacia confusa Merrill var. Inamurai Hayata n. v. Arbor circ. 10 m. alta, circ. 2 ped. in circumscriptione. Phyllodia latere compressa falcatolinearia lanceolata 10-8 cm. longa 7-4 mm. lata apice acuminata prope apicem subito angulo recto falcata basi attenuata in stipitem latere compressum 1½ mm. longum abeuntia membranaceo-coriacea utraque pagine manifeste 3-nervia, nervis parallelis, inter nervos 1-vena, venis parallelis, inter venas et nervos venulis longitudinaliter reticulatis, nervis venulisque utroque latere elevatis, margine integerrima sub lente nervata. Flores ignoti. Legumina valde complanata ± falcata circ. 10 cm. longa 7-8 mm. lata apice obtusa basi subito attenuata ad stipitem 5 mm, longum abeuntia valde complanata ad suturas utrasque costulata, costulis elevatis, facie ± depressa, inter cava seminum vix vel haud constricta, cavis seminum ± elevatis, valvis 2 chartaceis fusco-cinerascentibus. Semina ellipsoidea vel complanata apice rotundata basi obtusissima ad extremitatem breve obscureque apiculata 6½ mm. longa 3½ mm. lata 1½ mm. crassa, utraque facie annulariforme maculata, annulis singulis 4½ mm. longis 2 mm. latis ellipticis, facie fusco-fulvescentia.

Hab. Köshun: Kuraru, leg. T. Inamura, Oct. 1913, (fr.)

Very near the type, differs only by its much narrower leaves, pods and seeds.

ROSACEÆ. 5

It grows on the very windy side of the shore mountains in the southern part of Formosa. According to Mr. T. INAMURA, there is no difference between the type and the variety in the saplings. I doubt if this be not a mere form of the type.

Rosaceæ.

Rubus LINN.

Rubus glandulosopunctatus Hayata sp. nov. Frutex ramosissima, ramis et ramulis flexuosis sublævibus vel tenuissime striatis, cum foliolis calycibus petiolisque tenuiter hirtellis glanduloso-punctatis, punctis flavis minutis, aculeatis, aculeis cuspidato-triangularibus latere complanatis 2 mm. longis 11 mm. latis acutis leviter desuper recurvis. Folia 7-5-foliolata in circumscriptione lanceolato-ovata circ. 10 cm. longa 4-5 cm. lata, lateralibus oppositis subæqualibus vel superioribus ± minoribus, mediis ovato-oblongis ± obliquis 22 mm. longis 1 cm. latis apice acutis basi obtusissimis vel rotundatis chartaceis duplicato-dentatis, (dentibus primariis 4 mm. remotis, denticulis secundariis 1 mm. remotis triangulari-acutis), sessilibus, venis et venulis supra non visis costis venisque subtus prominentibus, venulis subtus minute reticulatis; foliolo terminali ovato-lanceolato 4, cm. longo 1½ cm. lato apice acuminatissimo basi obtusissimo margine duplicato-dentato, (dentibus primariis ½ cm. remotis 4 mm. altis, dentibus secundariis minutis 1 mm. a se remotis triangulari-acutis), venis lateralibus supra tenuiter impressis utraque latere costæ circ. 10 rectis ad apicem dentium primariorum attingentibus angulo 35° a costa egressis rectis subtus prominentibus, petiolis communibus 2½ cm. longis remotissime aculeatis gracilibus, rhachibus cum petiolulo folioli terminalis gracilibus 3 cm. longis, jugis foliolorum a se 1½-1 cm. remotis, stipulis linearibus 7 mm. longis 1 mm. latis acuminatis. ad axillas foliorum superiorum solitarii vel breve racemosi, racemis 1-2-floratis, pedicellis (vel pedunculis) erectis rectis. Cupula calycis 7 mm. in diametro extus ad centrum depressa, lobis ovato-triangularibus cum cuspidibus 7-8 mm. longis apice cuspidatis (cuspidibus 2 mm. longis vel longioribus) basi haud constrictis 4 mm. latis extus dense hirsutis vel glanduloso-punctatis intus velutinis crassiusculis margine tenuioribus. Petala rotundata 8-9 mm. in

diametro apice rotundata obtusa vel leviter emarginata basi brevissime unguiculata, (unguibus 1½ mm. longis ad basin 1 mm. latis), margine integra subrepanda hirsuta facie extus dense villosa intus tenuiter hirsuta basi crassiuscula alba. Stamina ∞ ad marginem cupulæ calycis inserta pluri-seriata, filamentis 3½ mm. longis ¼ mm. latis sursum constrictis, loculis antheræ lineari-oblongis ½-¾ mm. longis. Ovarium semi-obovoideum 1 mm. longum ½ mm. latum apice rotundatum basi cuneatum latere valde complanatum apice dorso glandulosomuricatum facie glabrum, stylo ad latus apicis ovarii sito 1½ mm. longo filiformi apice ± dilatato truncato. Receptaculum ellipsoideum cum stipitibus 4 mm. longum hirsutum basi pilosum. Syncarpium elliptico-globosum 7 mm. longum, stylis purpurascentibus, cupula reflexa.

Hab. Ritōzan, ad 6000 ped. alt., leg. T. KAWAKAMI, Aug. 1913.

Near Rubus rosæfolius var. Maximowiczii Focke, but differs from it in having minute glandular dots all over the plant.

Hamamelideæ.

Corylopsis SIEB. et ZUCC.

Corylopsis stenopetala HAYATA sp. nov. Frutex? Rami recti teretes cinereo-rubescentes lenticellis minutis elevatis notati deorsum glabri sursum hirsuti, prope summum dense villosi. Folia oblonga ovato-oblonga maxima 11 cm. longa 4½ cm. lata apice acuminatissima vel cuspidata, (cuspidibus triangulari-linearibus 1½ cm. longis 6 mm. latis, ad summum aristatis), deorsum a medio usque ad prope basin subcuneata ad basin truncata et leviter cordata, margine a basi cuspidis usque ad medium distincte et tenuissime aristato-dentata, (dentibus a se 7-8 mm. remotis latere superiore 1½ mm. longis latere inferiore 6-7 mm. longis ascendentibus brevissimis ad summum aristis 1½ mm. longis instructis), a medio ad basin subintegra sed remotissime aristata, (aristis a se 1-3 cm. remotis), chartacea, (supra costis venisque distincte impressis, subtus distincte prominenteque elevatis, venulis subtus transverse tenuissime reticulatis elevatis supra haud vel vix visis, venis primariis lateralibus utroque latere costæ 9 rectis ad apicem dentium attingentibus a costa angulo 35° egressis), basi subtrinervia supra subglabra subtus ad costas et venas tenuiter longeque barbata, barbis adpressis, petiolis

1½ cm. longis gracilibus subteretibus dense hirsutis. Spicæ subovatæ 2½ cm. longæ 2 cm. latæ; pedunculis in parte inferiore 5-6 nodosis ad nodos bracteatis et articulatis 1 cm. longis dense villosis bracteis basilaribus sterilibus imbricatis alabastrum spica complete involventibus, inferioribus sterilibus minoribus, mediis sterilibus majoribus, superioribus (in pedunculo) sterilibus gradatim minoribus ad bracteam fertilem abeuntibus, bracteis mediis (in pedunculo) ovatis valde concavis 1½-2 cm. longis 1½ mm. latis apice acutoobtusis, basi obtusis circ. 5-nerviis basin spicæ amplectantibus extus dense villosis intus tenuiter hirsutis. Pars florifera spicæ 2 cm. longa villosa densissime florata, bracteis (fertilibus) sub flore uno singulis late ovatis inferioribus 8 mm. longis totiusque latis apice triangularibus obtusis basi obtusis valde concavis florem semi-amplectantibus extus intusque dense villosis margine subintegris, bracteolis sub flore singulo duabus ovato-linearibus ± falcatis concavis 4 mm. longis 2 mm. latis apice basique obtusissimis extus dense intus tenuiter villosis. Calycis tubus late tubuloso-campanulatus 2 mm. longus 2½ mm. latus extus tenuiter subpilosus (pilis simplicibus vel fasciculatis) vel subglaber, ore brevissime 5-dentatus, dentibus latissime brevissime triangularibus vel obsoletis vel semirotundatis 4 mm. longis totiusque latis barbatis. 5 ad orem calycis affixa cum dentibus calycis alterna spathulata 4½ cm. longa 1½ mm. lata sursum obovata deorsum linearia, parte obovata 1½ mm. longa minus lata, parte lineari 3 mm. longa 3-1 mm. lata, basi 1 mm. lata, utraque glaberrima. Stamina 5 erecta recta exserta cum petalis alterna ad orem calycis inserta, filamentis linearibus valde complanatis 1 mm. latis 7mm. sursum gradatim angustioribus, antheris quadrangularibus 1 mm. longis minus latis subrectangularibus cum filamentis toto glabris. Glandulæ 5 clavato-complanatæ cum staminibus alternæ 1 mm. longæ 3 mm. latæ apice ± dilatatæ ad centrum impressæ. Ovarium fere inferius vel semi-inferius 2-loculare, loculis 1-ovulatis, ovulis ad summum placentæ pendulis anatropis raphis ventralibus. Styli 2 a basi distincti 6 mm. longi teretes basi dilatati ad ovarium abeuntes, sursum latere profunde sulcati prope summum muricatotuberculati, sursum ± tortuosi.

Hab. Shinshikei, ad 3000 ped. alt., leg. Tayemon Itō, Jan. 1913. Near Corylopsis Veitchiana Bean (Bot. Mag. t. 8349), but differs from it in the very much larger bracts, much narrower petals and in many other points; and from all other known species, this differs by the very narrow spathulate petals and ovate spikes and nearly truncate calyx.

Passifloreæ.

Modecca Lam.

Modecca formosana Hayata sp. nov. = Adenia formosana Hayata. Herba volubilis validiuscula. Caulis teres glaber cavus in exsiccato longitudinaliter rugulosus. Folia alterna petiolata palmatim 3-fida in circumscriptione pentagona maxima 11 cm. lata totiusque longa profunde 3-fida rarius 5-fida 3-nervia rarius 5-nervia, (nervis subrectis vel arcuato-divaricatis ad apicem segmentorum attingentibus a se angulo 45° divaricatis a basi usque 5 mm. altum se connatis), basi late truncata, parte truncata 6 cm. lata ad extremitatem subito attenuata, parte attenuata 3 mm. longa totiusque lata basi utroque latere auriculiforme cordata, auriculis supra in exsiccato rugosissimis, subtus ad centrum glandulis rotundatis subplanis 4 mm. in diametro instructis; nervis segmentorum lateralium excentricis, in basi 4 mm. a margine interiore distantibus basi a margine exteriore 12 mm. distantibus; segmentis lateralibus ± interiore falcato-divaricatis linearibus, segmento centrali subrecto lineari vel lanceolato vel lineari-lanceolato chartaceo 10 cm. longo 22 mm. lato apice acuminato basi vix vel haud angustiore margine integro utraque glabro, costis venis venulisque utraque pagine elevatis, venis lateralibus primariis manifestis 8 a costa angulo 70° egressis; sinibus inter segmenta obtusissimis, sub sinu subtus glandulis minimis unis sitis; glandulis flavescentibus punctiformibus, petiolis circ. 2 cm. longis vel brevioribus subteretibus vel subtetragonis supra et utroque latere tenuiter sulcatis basi vix vel haud dilatatis glabris, stipulis fere obsoletis vel minutis late cuspidato-triangularibus 1 mm. longis; cirrhis simplicibus axillaribus 10 cm. longis deorsum teretibus supra medium (bracteis minutis) sursum dorso complanatis. Racemi axillares 1-2-florati longe pedunculati, pedunculis 3-6 cm. longis glabris teretibus supra medium flores singulos vel geminos lateraliter gerentibus, supra partem floriferam elongatis ad cirrhos simplices complanatos abeuntibus, bracteis sub basi pedicelli floris singulis triangulari-acuminatis 2 mm. longis 14 mm. latis margine remote vel

9

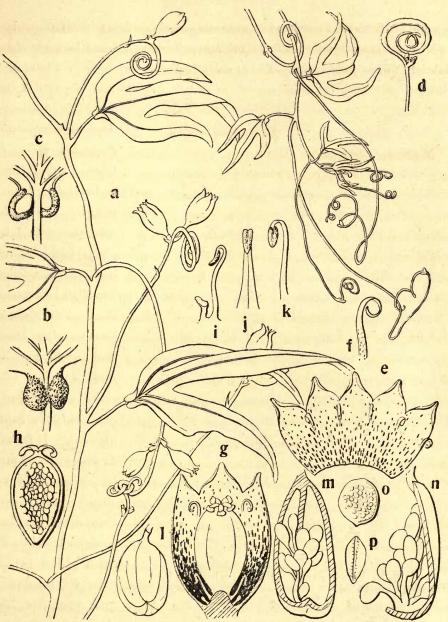


Fig. 1, Modeca formosana HAYATA; a, the plant; b, basal portion of a leaf, showing glands, seen from above; c, the same, seen from below; d, a tendril; e, calyx of a female flower, expanded; f, a petal; g, an ovary; h, the same, in vertical section; i, a staminode with a glandule; j, another staminode; k, the same, seen from side; l, a fruit; m, a valve of the same; n, the same, seen from side; o, a seed; p, the same, seen from side; a, m and $n \times \frac{1}{3}$; l, much reduced; others variously magnified.

obsolete denticulatis, bracteolis sub pedicello singulo duabus minutis triangulariacutis $\frac{1}{2}$ mm. longis, pedicellis infra medium articulatis 3–4 mm. longis teretibus glabris. Flores unisexuales. Fl. $\frac{1}{2}$: calyx fusiforme turbinatus vel tubiformis utrinque contractus vel apice semiclausus crassus 10–12 mm. longus 6–7 mm.

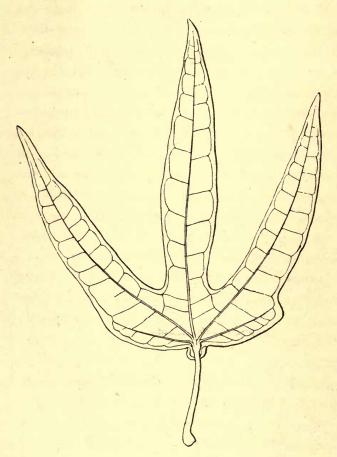


Fig. 2, Modecca formosana HAYATA; a leaf, seen from below; natural size.

latus facie 5-sulcatus inter sulcos impressim 1-striatus apice 5lobatus (lobis triangularibus 21 mm. longis 14 mm. latis dorso convexis intus planis) basi intus verticaliter lamellatus, lamellis ad columnam staminalem abeuntibus margine liberis cum petalis oppositis cum calycis lobis Petala 5 alternis. cum calveis lobis alterna linearia 2½ mm. longa ½ mm. lata apice acuta vel obtusa basi erecta apice exteriore reflexa margine interiore recurva glabra. Glandulæ vel squamæ 5 inter lamellas basi

calycis tubi sitas dispositæ cum staminibus oppositæ lineares dorso complanatæ planæ 1¾ mm. longæ ¼ mm. latæ apice truncatæ. Stamina 5 basi tubi calycis inserta 4 mm. longa, filamentis basi connatis 2¾ mm. longis dorso complanatis basi triangulari-dilatatis basi ¾ mm. latis, glabris, antheris basifixis

CORNACEÆ. 11

ovato-lanceolatis 24 mm. longis minus 1 mm. latis apice acuminatis apiculatis basi latioribus cordatis. Rudimentum ovarii filamentis firme involucratum cylindricum 2 mm. longum 1 mm. latum plurisulcatum infra apicem ± contractum. Fl. 9: calyces petalaque ut floris masculini; glandulæ breviores quam iis floris masculini. Staminodia triangulari-linearia 2½ mm. longa basi triangulari-dilatata 1 mm. lata apice obscure antheriformia. Ovarium stipitatum oblongo-ovoideum stylis stipitibusque exceptis 5 mm. longum 34 mm. latum glabrum 4-5-carpellare 1-loculare 4-5-placentiferum, placentis parietalibus, stylo brevissimo 1 mm. longo 4-5-lobo, lobis patento-reflexis dorso complanatis 1 mm. longis totiusque latis apice stigmate peltato rotundato ad centrum depresso terminatis, stipite 1½ mm. longo validissimo glabro tereti. Capsula pendula vel cernua stipitata longe pedunculata obovoidea 6 cm. longa 41 cm. lata apice depressa in sectione verticali apice cordata basi obtusa rotundata extus nitida flava usque rubra 4-5-valvata, valvis coriaceis lineari-lanceolatis utrinque obtusis intus albescentibus. Semina ∞ rotundata valde compressa ± angulata exocarpio membranaceo semi-hyalino obtecta, testa tenuiter coriaceo-crustacea extus remote grosseque impresso-punctata intus muricatoelevata, muricibus prominentibus obtusis trabeculiformibus, funiculis elongatis linearibus circ. 1 cm. longis complanatis 1 mm. latis, arillis campanulatocupuliformibus 2 mm. longis 4 mm. in diametro basin seminum amplectantibus membranaceis margine irregulariter denticulatis.

HAB. Formosa.

I have lost a label given by a collector and my note mentioning affinities and localities of this species. They should be given in the next volume.

Cornaceæ.

Cornus Linn.

Cornus longipetiolata Hayata sp. nov. Arbor? Ramuli glabri sublæves lenticellis minutis subalbis notati. Folia alterna approximatim sita longissime petiolata ovato-oblonga vel rhomboideo-oblonga 5–10 cm. longa 3½–7 cm. lata apice breve acuminata vel cuspidato-acuta basi rotundata obtusa cuneato-acuta chartacea margine integra sed sub lente minute denticulata supra viridia haud nitida subtus glaucissima subalba, costis venis venulisque tenuissime impressis subtus prominente distincteque elevatis, venis lateralibus primariis utroque latere costæ 5–7 angulo acuto vel obtuso a costa egressis, venulis transverse reticulatis, petiolis longissimis gracilibus 3–9 cm. longis laminam equantibus vel superantibus subtus dorso complanato-semiteretibus supra intus haud sulcatis planis basi vix dilatatis. Cymæ 8 cm. longæ 10 cm. latæ, floribus ignotis.

Hab. Tōyenchō: Shibutsuke, in montibus circ. 3000 ped. alt.; leg. I. Tanaka, Nov. 1913.

Near Cornus controversa Hemsl (=Cornus macrophylla Matsum Ind. p. 446), but differs from it in having very much longer petioles and leaves with depressed veins and veinlets on the upper surface. I am a little too bold in treating this plant as a new with such an imperfect specimen. Still the very much longer petioles and impressed veins and veinlets on the upper surface of the leaves are so remarkable that it is quite sufficient to recognize the plant as distinct from other species.

Caprifoliaceæ.

Viburnum LINN.

Viburnum arboricolum Hayata sp. nov. Frutex 5 m. altus vel altior, in trunco arboris crescens vel terrestris. Rami cinerascentes vel ± fulvescentes lenticellis minutis notati longitudinaliter rugosi. Folia opposita oblonga lanceolata vel oblongo-lanceolata maxima 17 cm. longa 8 cm. lata apice breve cuspidata, cuspidibus 1 cm. longis 5 mm. latis ad summum obtusis, vel simpliciter obtusa coriacea glabra supra (in vivo) non nitida opaca viridia subtus pallidiora basi cuneato-acuta margine a medio sursum dentato-serrata, (serris ascendentibus a se 7 mm. remotis apice interiore recurvis latere superiore 2 mm. longis latere inferiore 13 mm. longis), deorsum usque ad basin integra, costis supra planis vel tenuiter elevatis subtus prominente elevatis, venis lateralibus primariis utroque latere costæ 7–8, mediis angulo 60° a costa egressis ± arcuatis prope marginem evanescentibus, venis secundariis transversis transverse reticulatis, venis lateralibus supra tenuiter sed distincte impressis, subtus distincte elevatis, venulis supra non visis subtus distincte visis, petiolis 2 cm. longis. Cymæ terminales pyramidales in circumscriptione 15 cm. longæ

totiusque latæ, (pedunculis 5 cm. longis), verticillatim 2-superpositim ramosæ, ramis inferioribus rectangulare patentibus 7 cm. longis, ramis superioribus gradatim brevioribus, ramulis rectangulare patentibus stellato-pilosis, bracteis triangularibus lanceolatis 1 mm. longis stellato-pilosis apice obtusis. campanulati 7 mm. longi 6 mm. lati. Calycis tubus basi cum pedicellis articulatus 2 mm. longus cylindricus 1 mm. latus glaber, limbo 1 mm. longo campanulatopatenti late 5-dentato, dentibus late triangularibus minus 1 mm. longis 1 mm. latis apice acutis vel breve cuspidato-acutis. Corolla cylindrico-campanulata utraque glabra 5 mm. longa, tubo 3 mm. longo totiusque lato, lobis late cordato-rotundatis 2 mm. longis totiusque latis apice rotundatis basi cordatis, partibus cordatis imbricatis margine integris vel obscure crenulatis. Stamina 5 ad faucem corollæ tubi affixa. Stylus validus basi conicus apice clavatus 3-sulcatus. Drupa ellipsoidea 8 mm. longa 4½ mm. lata apice reliquis calycis loborum et styli coronata 1-sperma. Putamen semi-ellipsoideum, in sectione rotundatum 7-8 mm. longum 4 mm. latum, dorso acute 2-costatum latere acute angulatum facie profunde sulcatum vel excavatum.

Hab. Mt. Arisan: Funkiko, ad 6000 ped. alt.; in truncos arborum crescens, leg. B. Hayata et S. Sasaki, Jan. 1912. fl.; Rinkiho, leg. T. Doi, 1912, fr.

Near V. odoratissimum Ker., but easily distinguishable by the deeper green lusterless leaves.

Viburnum melanophyllum Hayata, sp. nov. Rami oppositi purpureo-fusco-cinerascentes, cortice longitudinaliter rugoso. Folia ut videntur decidua late ovata 5 cm. longa 3 cm. lata apice breve acuminata basi rotundata in exsiccato nigricantia supra ad costam et venas stellato-tomentosa, subtus ad costas venas venulasque dense stellato-tomentosa membranacea margine serrulata, serrulis minutis 1 mm. longis totiusque latis apice aristato-acutis a se 1 mm. remotis, venis primariis lateralibus utroque latere costæ 9–10, mediis angulo 40° a costa egressis subrectis sursum ramosis, ramis rectis ad apicem serrularum attingentibus, supra tenuiter impressis, subtus costis venisque prominentibus, venis secundariis transversis minute transverse reticulatis elevatis, petiolis 15 cm. longis. Cymæ terminales a basi ramosæ vel cæspitosæ dense tomentosæ, basi cataphyllis 3–4 lanceolatis crassiusculis 2 mm. latis 1 cm. longis

obtusis instructæ, 3 cm. longæ totiusque latæ ramosæ, bracteis lanceolatis dense stellato-tomentosis 5 mm. longis $1\frac{1}{2}$ mm. latis. Fl. steriles marginales: corolla rotato-patens irregularis 5-lobata, lobis inæqualibus majoribus rotundatis 4 mm. in diametro. Fl. fertiles: calycis tubus suburceolatus vel truncato-obconicus subglaber 1 mm. longus $\frac{2}{3}$ mm. latus, limbo 5-partito, partibus linearibus 1 mm. longis obtusis dense tomentosis. Corolla 5-lobata, lobis rotundato-oblongis. Stamina 5. Stylus ovoideo-coriaceus, stigmate 3-lobato.

Hab. Mt. Takasan, 6000 ped. alt., leg. N. Konishi, 1909, mart. Near V. furcatum Blume.

Viburnum propinguum Hemsl. Ind. Fl. Sin I. p. 355. Rami teretes oppositi fusco-rubescentes lenticellis rotundatis notati. Folia opposita ovata ovoto-oblonga 9 cm. longa 4½ cm. lata apice acuta vel triangulari-acuta basi late acuta vel obtuso-acuta coriacea vel coriaceo-chartacea utraque glabra margine remote serrulata, serrulis brevissimis ad mucronem reductis ½ mm. longis a se 9 mm. remotis, prope basin integra trinervia, nervis lateralibus a basi folii 5 mm. remotis arcuatis, nervis supra impressis subtus prominentibus, venis primariis lateralibus transversis venulis reticulatis supra impressis subtus tenuiter distinctis, petiolis 1½ cm. longis intus sulcatis glabris. Cymæ terminales 6 cm. longæ 4½ cm. latæ umbellatim ramosæ, pedunculis 2 cm. longis, bracteis ovatis minutis caducissimis, pulvinis sub bractea elevatis, ramis primariis (radiis umbellarum) 7, 2 cm. longis, ramis secundariis 5-6, 8 mm. longis, ramis tertianis (pedicellis) 3-4, 2-4 mm. longis breve hirsutis. Flores rotato-patentes 4 mm. in diametro 3 mm. longi. Calycis tubus 1 mm. longus, limbo campanulato-patenti circ. 1 mm.longo 5-lobato, lobis triangularibus apice obtusis ½ mm. longis 1 mm. latis. Corolla campanulato-rotata, tubo 1 mm. longo 5-lobato intus hirsuto et glanduloso-piloso, pilis clavatis glandulosis brevissimis, lobis oblongis 11 mm. longis apice rotundatis basi haud contractis extus glabris intus prope basin hirsutis margine integris exteriore ± recurvis. Stamina 5 ad basin tubi corollæ affixa, filamentis 1½ mm. longis linearibus apice filiformibus, antheris ellipticis dorsifixis. Ovarium inferius, stylo conico 3-sulcato.

HAB. Mt. Nantan, leg. U. Mori, 1910, Aprili. (fl.).

ERICACEÆ. 15

Ericaceæ.

Rhododendron LINN.

Rhododendron (Choniastrum) Tanakai HAYATA sp. nov. Frutex 3m. altus, in saxa ± subscandens. Ramuli graciles teretes, cortice rubro-cinerascenti longitudinaliter fisso et soluto, cicatricibus cataphyllarum transverse linearibus 3 mm. latis 10 mm. longis remote notati, ad ramificationem cicatricibus semirotundatis foliorum verticillatim notati, usque ad ramificationem recti vel ± recurvi sub-dichotome ramosi sursum 3 mm. in diametro. Folia ad summum ramulorum verticillatim sita coriacea supra atro-viridia impresse reticulata subtus pallida ovato-oblonga 10-15 cm. longa 41-5 cm. lata apice acutoacuminata ad summum obtusiuscula basi rotundata ad extremitatem subito breveque attenuata ad petiolum abeuntia basi ± obliqua vel interdum acutoacuminata margine integra subplana ± tenuiter desuper recurva utraque pagine haud nitida, costis venis venulisque supra impressis, costis subtus prominente elevatis validiusculis basi 2 mm. latis, venis lateralibus utroque latere costæ 10-12 gracillimis subtus tenuissime elevatis rectis angulo 70° a costa egressis prope marginem reticulatim ramosis et evanescentibus, venulis tenuissimis tenuissime elevatis distincte visis, utraque pagine glabra, petiolis 2 cm. longis semi-teretibus supra planis medio tenuiter sulcatis subtus convexis apice ± subalatis vel haud alatis basi vix dilatatis in exsiccato fusco-nigricantibus. Gemmæ florum ad apicem ramulorum circa gemmam foliorum verticillatim 3-4-5 sitæ, 1-floratæ elongato-oblongæ vel oblongo-fusiformes 4 cm. longæ 14 mm. latæ utraque extremitate obtusæ, perulis ∞ scariosis, basilaribus extimis minutis triangulari-ovatis 4 mm.longis totiusque latis apice gradatim longioribus, interioribus superioribus longissimis obovato-spathulatis 3 cm. longis 13 mm. latis apice late triangularibus obtusis basi longe attenuatis margine integris interiore recurvis sursum intus plus extus minus sericeopubescentibus deorsum glabris, perulis intimis spathulato-linearibus longissimis 33 mm. longis apice 5 mm. latis deorsum gradatim angustioribus ad basin 1 mm. latam reductis margine ciliatis extus glabris intus tenuiter pubescentibus apice rotundatis margine interiore recurvis post anthesin caducissimis.

Flores apertientes campanulato-infundibuliformes 5 cm. longi albi vel leviter albo-purpurascentes, pedicellis brevioribus glabris 5 mm. longis teretibus, Calyx viridis 5-lobatus, lobis patentibus late triangulari-semi-rotundatis, -- formiter recurvis, i.e. basi deorsum apice sursum recurvis, 4 mm. longis 14 mm. latis apice late rotundatis margine pectinato-ciliolatis, ciliolis glandulosis, utraque facie glabris. Corolla campanulato-infundibuliformis 5 cm. longa 6 cm. lata, tubo 18 mm. longo basi 4 mm. lato apice usque ad 11 mm. latum dilatato, limbo 5-partito-lobato prope basin lobi superi maculatopunctato, maculis flavescentibus, lobis obovato-oblongis 33 mm. longis 25 mm. latis apice rotundatis vel ad centrum tenuiter retusis vel haud retusis margine crenulatis ± undulatis multinervis longitudinaliter reticulato-venulosis, utraque pagine glabra sed prope basin corollæ tubi interiore tenuissime hirsuta. Stamina 10 in longitudine variabillima, longissimum 4 cm. longum brevissimum 28 mm. longum, filamentis filiformibus complanatis usque 1 mm. latis sursum minus latis supra basin usque ad infra medium hirsutis cæterum glabris, antheris versatiliter dorsifixis obovato-rectangularibus 3 mm. longis 2 mm. latis apice truncatis breve 2-lobatis 2-porosis (poris ± oblique terminalibus circ. 1 mm. in diametro) basi retusis, loculis apice truncatis basi obtusis tenuiter brevissime 2-lobulatis, connectivis apice haud productis basi brevissime productis ad summum extremitatem retusis. Ovarium viride cylindricum ± declinatum 9 mm. longum basi 3 mm. latum apice 2 mm. latum apice truncatum basi haud contractum 5-lobatum 5-sulcatum, stylo declinato ~-formiter recurvo 31-4 cm. longo glabro circ. 1 mm. in diametro sectionis apice vix dilatatis infra stigma 3 mm. in diametro. Stigma viride 5-partitum in partem apicalem styli cupuliformem insitum, partibus cuneiformibus 11 mm. longis apice truncatis. Disci annuliformes sub ovario siti margine remote denticulati, denticulis \(\frac{1}{3}\) mm. longis rectangularibus apice truncatis a se \(\frac{1}{2}\) mm. remotis, sinibus inter denticulos rotundatis. Capsula ignota.

Hab. Mt. Arisan: inter Karapin et Suisharyō, ad 3000 ped. alt., leg. B. Hayata et I. Tanaka, 1913, Aprili. (fl.).

Near R. ellipticum Maxim. and R. leiopodum Hayata, but separable from them by the larger darker green leaves, nearly white flowers, very much shorter pedicels, and especially by the pectinately ciliate calyx-lobes. The plant seems to be rather rare. We could find the tree only once in the Arisan ranges, during our journey through the mountains. It is a dwarf shrub nearly 2-3 m. high, sending the branches downwards along the rocks where it stands.

Moneses Salisb.

Moneses rhombifolia A. Andres Piroleen-Studien, in Verh. Bot. Ver. Prov. Brand. LVI. (1914), pp. 23 et 69.

Chimaphila rhombifolia Hayata Ic. Pl. Formos. II. (1912) p. 119, t. XVI.

Diapensiaceæ.

Shortia Torr. et Gr.

Shortia ritoensis HAYATA sp. nov. Shortiopsis ritoensis HAYATA in Sched. Herb. Mus. Taihoku. Rhizoma erectum validiusculum. Folia omnia radicalia coriacea longe petiolata, lamina ovato-oblonga vel oblonga ± rectangulariformi 18 mm. longa 13 mm. lata apice obtusissima ad centrum mucronata basi fere truncata ad basin subito ad petiolum attenuata utraque glaberrima concolora margine partibus prope apicem basinque exceptis serrata, serris utroque latere margine 6-7 a se 2 mm. remotis transverse ascendentibus late triangularibus apice ascendentibus 1½-2 mm. latis ½-1 mm. longis obtusis ad summum mucronibus brevissimis coronatis, margine crassomarginata basi apiceque subintegra, costis venisque supra tenuiter elevatis subtus costis prominente elevatis venis planis, venis lateralibus utroque latere costæ 4 subrectis apice obscuris ad apicem serrarum obscure attingentibus a costa angulo 60°-70° egressis, venulis non distinctis sub luce transversa visis reticulatis, petiolis gracilibus cum laminis foliorum desuper arcuatis ad terram attingentibus 23-25 mm. longis subalatis supra profunde sulcatis subtus costatis basi ± dilatatis. Scapi cum foliis æquilongi erecti terminales, basi bracteis basilaribus (vel cataphyllis) 3-4-verticillatis instructi, bracteis basilaribus lanceolatis 8 mm. longis 2 mm. latis concavis margine interiore recurvo-revolutis apice acuminatis multinervis, a supra basin usque ad prope apicem nudi, prope apicem sub flore 1-2-bracteis superioribus instructi, bracteis superioribus ovato-lanceolatis acuminatis 5 mm. longis valde concavis margine interiore revolutis. Flores ad apicem scapi solitarii; calycis lobi 5, 3-exteriores ovati

5½ mm. longi 3½ mm. lati apice acuti ad summum submucronati basi haud vel vix contracti, 2-interiores elliptici 5 mm. longi 2½ mm. lati apice rotundati vel obtusissimi ad summum retusi vel brevissime 2-lobati ad centrum sinus brevissime mucronati basi contracti rotundati 1 mm. lati margine prope apicem minute denticulati ceeterum integri intus plani extus medio tenuiter costati (costis basi triangulari-dilatatis), multinervii. Corolla (alba?) campanulata 7 mm. longa 5-lobata extus intusque glabra, tubo 1½ mm. longo, lobis cuneatoobovatis 6 mm. longis 4 mm. latis apice rotundatis basi late cuneatis sed vix angustatis apice 3-5-lobato-dentatis, dentibus triangularibus 1 mm. latis totiusque longis apice obtusis vel acutis interdum obtusissimis latere margine integris basi vix contractis pinnivenis, venis latelaribus utroque latere 2-3, venis ad apicem dentium attingentibus, sinibus inter lobos obtusissimis. Stamina 5 cum lobis corollæ alterna, filamentis validiusculis basi ad tubum corollæ usque ad sinus inter lobos corollæ adnatis, partibus liberis 1 mm. longis 1 mm. latis valde complanatis ad basin utroque latere appendiculatis, appendiculis mucroniformibus 1 mm. longis, antheris cordatis 1 mm. longis 1½ mm. latis apice emarginatis basi cordatim bilobatis intus A-formibus extus P-formibus dorsifixis, apicibus filamentorum vel connectivis dorso latioribus. Ovarium late globosum 11 mm. longum 11 mm. latum apice planodepressum tenuiter 3-lobatum vel obscure vel haud lobatum glabrum, stylo columniformi tereti 2½ mm. longo apice truncato tenuiter 3-lobato. Capsula ovato-globosa 3 mm. longa loculicide dehiscens, valvis a placenta solutis, stylo non partito. Semina o rubra scobiformia ellipsoidea angulata 3 mm. longa, testa elegante reticulata. Staminodia nulla.

HAB. Mt. Ritozan, by T. KAWAKAMI, Juli. 1913.

Resembles Shortiopsis* exappendiculata Hayata (=Shortia exappendiculata Hayata Ic. Pl. Formos. III. p. 147) in having nearly sessile anthers, not divided styles of the capsules and in the absence of the staminodes; but differs from it by the far much smaller leaves with different dentation, by the smaller flowers, very short broader complanate filaments with appendices on both sides and by the differently shaped anthers.

Orobancheæ.

Boschniakia C. A. MEY.

Boschniakia Kawakamii Hayata sp. nov. Parasitus ad radices Rhododendronis sp. Volva ignota. Caulis 13-35 cm. longus teres 1\frac{1}{4}-2 cm. in diametro glaber basi squamis late triangularibus dense imbricatim obtectus, squamis sursum gradatim longioribus remotioribus in racemo ad bracteas abeuntibus, squamis superioribus infra partem floriferam caulis triangularilanceolatis 18 mm. longis 8 mm. latis coriaceis in exsiccato valde fragilibus concavis apice obtusis vel obtusissimis basi haud contractis ± dilatatis decurrentibus utraque facie glabris a se 1-1½ cm. remotis. Racemi floriferi ignoti. Racemi (partes caulium fructiferorum) 8-16 cm. longi cylindrici cum fructibus 3-3½ cm. lati, bracteis elongato-obovatis oblongo-obovatis 2 cm. longis circ. 1 cm. latis apice triangulari-obtusis basi vix angustioribus ± cuneato-angustatis vel haud angustioribus ad basin 6 mm. latis ± decurrentibus, bracteolis nullis, pedicellis 3-2 mm. longis 2 mm. latis subcomplanatis apice gradatim dilatatis ad calycem abeuntibus glabris. Calyx fructifer: tubi subnulli vel brevissimi, limbo subpatenti cum receptaculo 8 mm. in diametro 4 mm. in radio margine integro vel irregulariter 3-5 lobato, lobo postico longiore late obovato-oblongo 3 mm. longo totiusque lato apice truncato-obtuso basi vix angustiore, lobis lateralibus sub-oblongis cum lobis anterioribus 2 connatis, margine in totum tolis minute denticulatis minute remote brevissimeque glanduloso-ciliolatis. Capsula ovoidea ± obliqua anteriore basi plus convexa posteriore minus convexa, inferior major 2 cm. longa 14 mm. lata apice triangulari-pyramidalis acuto-obtusa basi obtuso-rotundata sursum 3-gona 3-valvata, valvis ovato-triangularibus apice triangularibus ab apice usque ad medium solutis apice brevissime 2-fidis glabris. complanata multi-angulariformia 1 mm. in diametro 1 mm. crassa radialiter reticulata, reticulis valde profundis alvum similantibus.

Hab. Mt. Morrison, ad 10000 ped. alt., leg. T. KAWAKAMI et S. Sasaki, Oct. 1909.

Very near Boschniakia himalaica Hk. f. et Th., but differs from it by the very short fruit-bearing pedicels attaining 2 mm. in length, (in Himalayan

20 LAURINEÆ.

species it is ½ in. long), and by the irregularly lobate and minutely glandularly ciliolate calyx-limb. Capsule in this species is always regularly 3-valved, while in Himalayan species it is irregularly 2-3 valved.

Laurineæ.

Beilschmiedia NEES.

Beilschmiedia erithrophloia Hayata sp. nov. Arbor, truncus erectus et rectus, cortice rubescenti variegato. Rami recti subternatim ramosi longitudinaliter rugulosi cicatricibus minutis elevatis notati. Folia tenuiter coriacea, in exsiccato costis et venis subrubescentibus, in vivo viridia supra nitida oblonga ovato-oblonga vel ovato-lanceolata 9 cm. longa 4½ cm. lata apice acuminata sed ad summum obtusissima vel simpliciter obtusa basi cuneato-acuta obtusa ad petiolum attenuata plus minus obliqua, costis rubescentibus supra subplanis vel tenuiter sulcatis subtus tenuiter elevatis, venis et venulisque utraque pagine distincte elevatis elegante reticulatis, reticulis subtus plus distinctis, utraque pagine glaberrima margine integerrima sed ± repando-undulata, venis primariis utroque latere costæ 5–6 arcuatis, petiolis 1½–2 cm. longis semiteretibus ± complanatis sursum intus planis deorsum sulcatis. Flores ignoti. Bacca obovoidea 2 cm. longa 12 mm. lata apice rotundata basi obtusa nigra nitida uni-sperma, pedicello haud incrassato.

Hab. Mt. Arisan, (3000 ped. usque ad 7000 ped. alt.), leg. R. Kanehira, I. Tanaka et B. Hayata, Aprili., 1914.

One of the specimens of this species in my previous collections was brought to Kew by Mr. W. R. Price for comparison, and it was sent back to me with the following note. "Mr. Gamele identifies this as a species of Beilschmiedia Nees., but can not match. The venation and shape of buds separate it from Cinnamomum.—W. R. P. The tree is very common in the Arisan ranges. I found the tree bearing fruit in January, 1912, and also in April, 1914; but I could never seen the flowers.

Cinnamomum Blume.

Cinnamomum pseudo-Loureirii Hayata sp. nov. Fructus pisiformis ellipsoideus 1 cm. longus 6 mm. latus, tubo calycis auctato late campanulato 3 mm. longo $4\frac{1}{2}$ mm. lato, pedicellis 6 mm. longis.

Hab. Tōyen: Taiyakan, leg. I. Tanaka et S. Nakai, Oct. 1912, fr. Very near *Cinnamomum Loureirii* Nees., but differs from it by the quite entire calyx. Full description should be given in the next volume.

Cupuliferæ.

Quercus LINN.

Quercus kodaihoensis HAYATA sp. nov. (Tab. IV.) (Pasania kodaihoensis HAYATA) Arbor. Rami fusco-cinerascentes lenticellis minutis rotundatis parce notati, ramulis et petiolis fusco-pubescentibus sulcato-angulatis. Folia oblonga obovata vel oblongo-ovata in magnitudine variabillima, minora 8 cm. longa 3 cm. lata, maxima 14 cm. longa 6 cm. lata, apice cuspidato-acuminata basi cuneata vel obtusa margine sursum serrata, (serris ascendentibus a se 1-1½ cm. remotis latere superiore 2 mm. longis latere inferiore 1-1½ cm. longis), chartacea vel tenuiter coriacea supra (in exsiccato) viridia subtus plus minus pallida, costa supra impressa subtus elevata, venis primariis lateralibus supra impressis subtus elevatis utroque costæ latere 8-9 mediis angulo 50 a costa egressis subtus distincte elevatis, petiolis 1-3 cm. longis, intus tenuiter sulcatis basi Cupula turbinata 11 cm. longa 3 cm. in diametro basi valde tumidis. rotundata ore leviter contracta 17 mm. in diametro, extus lepidibus triangularibus cuspidatis dense imbricatis adnatis obtecta, (lepidibus inferioribus longe triangularibus 1 mm. longis 4 mm. latis apice cuspidatis, superioribus late triangularibus apice cuspidatis multo minoribus), intus cicatricibus glandum perfecte occupata partibus ultra cicatricem 3 mm. altis. Glans semi-globosa 2 cm. longa 28 mm. in diametro basi cupula complete involucrata (cicatrice convexa rotundata), apice subtruncata leviter convexa vel subplana exposita tenuiter sericeo-villosa ad centrum mucronato-apiculata.

HAB. Kagi: Kodaiho, Sankyakunanzan, leg. S. NAKAI, Nov. 1912.

Near Q. Konishii, but differs from it by the much deeper cups, and by the truncated semi-globose glans. Also near Quercus Cornei in the shape of the cones, but differs in having far much smaller leaves.

Quercus stenophylloides Hayata sp. nov. Arbor. Rami cinerei longitudinaliter rugulosi, cicatricibus minutis remote notati. Folia coriacea ovato-oblonga vel ovato-lanceolata 9 cm. longa 3 cm. lata apice acuminata

22 CONIFERE.

rotundata obtusa vel acuta margine basi apiceque integra cæterum aristatodentata, (dentibus 1 cm. a se remotis late brevissime triangularibus latere inferiore 1 cm. longis latere superiore 1½ mm. longis ascendentibus sursum ± recurvis aristatis, aristis 1 mm. longis obtusis ± superiore recurvis), supra nitida in exsiccato subrubescentia vel subviridescentia subtus glaucissima, costis venisque supra tenuiter sulcatis vel planis, subtus costis prominente elevatis venis tenuiter sed distincte elevatis gracillimis, venis primariis lateralibus utroque latere costæ 10–11 subrectis, mediis a costa angulo 45° egressis prope marginem subarcuatis ad apicem dentium attingentibus, venulis supra minute reticulatis subtus haud vel vix visis, petiolis 1½ cm. longis gracillimis semiteretibus intus subplanis vel late sulcatis. Cupula præmatura obconica 8 mm. longa 11 mm. lata ore vix vel haud contracta sessilis extus villosa, lepidibus (bracteis) connatis spiraliter 5-annulatis, annulis a se 2 mm. remotis margine denticulatis, denticulis truncatis dense villosis. Glans conico-globosa matura non visa.

Hab. Mt. Arisan, leg. K. UYEMATSU, 1912, Sept.

Near Quercus stenophylla Mk.; but differs from it in having thicker leaves with different dentation.

Coniferæ.

Cephalotaxus Zucc.

Cephalotaxus Wilsoniana Hayata sp. nov. Arbor, ramulis rectis subglabris. Folia disticha spiraliter disposita linearia 4 cm. longa 3 mm. lata apice gradatim acuta basi obtuso-contracta supra in exsiccato costa distincte prominenteque elevata subtus minus distincte elevato-plana, margine tenuissime desuper recurva, subtus inter marginem et costam glaucissima. Drupa ellipsoidea vel obovato-ellipsoidea 18 mm. longa 10 mm. lata apice acuta breve apiculata basi obtusa subsessilis.

Cephalotaxus sp. Hayata Fl. Mont. Formos. p. 215.

Hab. Mt. Arisan, leg. K. Uyematsu, (No. 18) typus; Ganzan, leg. Nagasawa, (No. 568).

Very near Cephalotaxus drupacea S. et Z., differing from it only by leaves with less acute (or nearly obtuse) apex and narrower base.

Hydrocharideæ.

Hydrocharis LINN.

Hydrocharis asiatica Miq.

HAB. Köshūn (Herb. Taihoku).

Orchideæ.

Oberonia LINDL.

Oberonia arisanensis Hayata sp. nov. (Fig. 3, a-e, and h.) Epiphyta pendula. Caulis cum spicis 15 cm. longus cæspitosus, partibus foliatis inferioribus 6 cm. longis dense approximatim foliatis, partibus floriferis pendulis filiformibus

7 cm. longis, partibus inter eam floriferam et eam foliatam 2-3cm. longis squamiferis, squamis lanceolatis acuminatis 2 mm. longis. Folia alterna disticha approximata in exsiccato coriacea in vivo crassiuscula imbricata semi-oblonga equitantia latere compressa plana 11-2 cm.

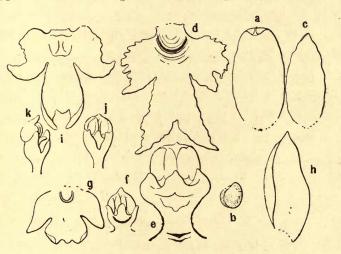


Fig. 3, a, b, c, d, e, h, Oberonia arisanensis Hayata; a, a dorsal sepal; h, a lateral sepal; c, a petal; d, a lip; e, a column; b, a pollinium; f, g, Oberonia formosana Hayata; g, a lip; f, a column, seen from front; i-k, Oberonia kusukusensis Hayata; i, a lip; j, a column, seen from front; k, the same, seen from side.

longa 5 mm. lata apice obtusa vel ad summum apiculata basi ad vaginam abeuntia haud articulata, margine inferiore recta, margine superiore —formiter recurva, vaginis se imbricatis. Spicæ 7 cm. longæ, rhachibus filiformibus, floribus verticillatim aggregatimque ad nodos sitis, nodiis a se 1–2 mm. remotis, bracteis ovato-lanceolatis $1\frac{1}{2}$ mm. longis $\frac{2}{3}$ mm. latis apice acuminatis margine obscure erosis, pedicellis cum ovariis 1 mm. longis. Sepalum posticum oblongum 1 mm. longum $\frac{2}{3}$ mm. latum sursum concavum versus

apicem interiore recurvum breve cuspidatum, partibus cuspidatis interiore incurvis, margine integrum; sepala lateralia ovato-triangularia basi latissima 1 mm. longa $\frac{3}{4}$ mm. lata apice acuta basi haud contracta concava. Petala oblonga 1 mm. longa $\frac{1}{2}$ mm. lata apice obtusa basi haud contracta margine erosa. Labellum rubesens, ancoræforme $1\frac{1}{3}$ mm. longum totiusque latum alte trilobum, lobis basilaribus (lateralibus) oblongis $\frac{1}{2}$ mm. longis apice obtusissimis basi vix contractis margine eroso-fimbriatis vel erosis, lobo terminali rectangulari 1 mm. longo $\frac{1}{2}$ mm. lato apice 2-lobo, lobis oblongo-triangularibus $\frac{1}{3}$ mm. longis totiusque latis apice acutis, sinibus inter lobos truncatis interdum lobulo singulo brevissimo ad centrum instructis. Labellum basi \pm saccatim impressum. Columna brevissima

Hab. Arisan: inter Taroyen et Funkiko, circ. 6000 ped. alt., leg. B. Hayata et T. Itō, Mart. 1914, (fl.).

Near O. kusukusensis Hayata, but differs from it by the very short columns and much larger lips. Also near O. formosana Hayata, but easily distinguishable by the larger leaves.

Oberonia bilobatolabella Hayata sp. nov. (Fig. 4.) Epiphyta cæspitosa pendula. Caulis cum racemis 15 cm. longus, partibus inferioribus foliosis 6–7 cm. longis, partibus floriferis 8 cm. longis filiformibus, partibus

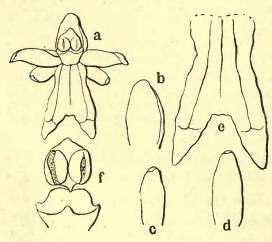


Fig. 4, Oberonia bilobatolabella HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column, anther being a little lifted.

caulis inter foliatam et floriferam 2-3 cm. longis subnudis vel paucissime squamatis, squamis 1-2 lanceolatis 1 cm. longis subequitantibus. Folia equitantia latere compressa complanata crassiuscula semioblongo-linearia circ. 3 cm. longa 3 mm. lata apice obtusoacuta basi non contracta cum vaginis articulata margine superiore recta margine inferiore -formiter recurva in exsiccato coriacea, vaginis

tenuibus rhomboideis alternis imbricatis circ. 1 cm. longis. Racemi 5-8 cm. longi 8 mm. lati penduli, rhachibus pentagonis 🖒 -formibus filiformibus tenuibus, floribus ad nodos subverticillatim aggregatim sitis, nodis a se circ. 5 mm. remotis, bracteis singulis sub flore uno sitis ovato-triangularibus 13 mm. longis circ. 1 mm. latis apice obtusis basi haud vel vix contractis margine irregulariter eroso-denticulatis, pedicellis cum ovariis 2 mm. longis. Flores circ. 3 mm. longi, sepalis petalisque retrorsum reflexis, labello antice patenti. Sepalum posticum rotundato-ovatum minus 1 mm. longum 3 mm. latum, apice obtusum basi contractum, lateralia ovato-triangularia valde concava 1 mm. longa 3 mm. lata apice obtusa basi haud contracta. Petala lineari-oblonga plus 1 mm. longa minus $\frac{1}{2}$ mm. plus $\frac{1}{3}$ mm. lata apice obtusissima basi vix contracta. Labellum in circumscriptione rectangulare plus 2 mm. longum plus 1 mm. latum planum basi ½ mm. latum 2-nervium basi utroque latere auriculis minutis ½ mm. latis semi-rotundatis instructum, supra medium 2-lobatum, lobis oblongotriangularibus circ. 1 mm. longis plus 4 mm. latis apice acutis basi haud contractis, sinibus inter lobos truncatis 1 mm. latis. Columna brevissima 1 mm. longa 1 mm. lata.

Hab. Arisan, leg B. Hayata et S. Sasaki, Jan. 1912.

Near Oberonia arisanensis HAYATA, but differs from it by the much larger flowers with nearly obsolete or, if at all, very much smaller lateral lobes of the lips and by the distinctly articulated leaves.

Oberonia formosana Hayata (Fig. 3, f, g), Mater. Fl. Formos. p. 309. Epiphyta cæspitosa, caulibus simplicibus vel rarius pauciramosis 3-5 cm. longis toto longitudine foliatis. Folia disticha sessilia alterna approximata equitantia verticaliter compressa lineari-lanceolata 22 mm. longa 2½ mm. lata apice aristato-acuta margine integra basi latere inferiore recta superiore —-formiter curva vaginosa caulem amplectantia crassiuscula. Spicæ terminales cum pedunculis 8 cm. longæ cernuæ, floribus minutis 1 mm. in diametro, secus rachin interrupte fasciculatim dense sitis, bracteis ovato-acuminatis 1 mm. longis reflexo-patentibus. Sepala lateralia late ovata basi connata ½ mm. longa totiusque lata obtuso-acuta patentissima, posticum minus. Petala sepalo angustiora oblonga ¾ mm. longa ¼ mm. lata obtusa. Labellum sessile concavum rotundatum in circumscriptione ¾ mm. longum totiusque

26 ORCHIDEÆ.

latum 3-lobatum, lobo medio majore apice tenuiter 3-lobulato obtuso, lobis lateralibus acutis brevioribus, basi minute callosum, callis rubris. Columna brevissima 3 mm. longa.

HAB. Nantō: Randaizan. leg. T. KAWAKAMI et U. Mori, Juni. 1907, (No. 3474).

Somewhat near O. japonica Maxim., but differs from it in having long lanceolate leaves which are as three times long as those of the Japanese plant; still nearer O. Clarkei in its habit and leaves, but differs from it by the lips with acute entire side-lobes which in O. Clarkei are fimbriate.

Oberonia kusukusensis Hayata sp. nov. (Fig. 3, i-k.) Epiphyta, Caulis cum spicis 10-15 cm. longus, partibus inferioribus cæspitosa pendula. foliatis 3 cm. longis, partibus floriferis circ. 10 cm. longis pendulis filiformibus, partibus caulis inter floriferam et foliatam minute squamiferis circ. 2 cm. longis, toto glaber. Folia non articulata approximata disticha alterna basi se imbricata lineari-semilanceolata media 2-3 cm. longa 5 cm. lata apice acuta vel subobtusa breve apiculata basi caulem amplectantia in exsiccato membranacea in vivo crassiuscula equitantia a latere compressa complanata a caule angulo 30°-50° egressa margine inferiore recta margine superiore -formiter recurva, vaginis cum lamina continuis. Spicae 10 cm. longæ filiformes, floribus ad nodos subverticillatim aggregatimque sitis, bracteis singulis sub flore uno sitis, nodis a se 2 mm. remotis bracteis triangulari-lanceolatis 1½ mm. longis 1 mm. latis apice acuminatis, pedicellis 1 mm. longis, ovariis 1 mm. longis. Flores apertientes 1½ mm. in diametro; sepalum posticum obovato-oblongum 3 mm. longum circ. 1 mm. latum apice obtusissimum basi ± contractum margine obscure denticulatum vel integrum; sepala lateralia valde concava triangulari-oblonga 3 mm. longa basi latissima non contracta 3 mm. lata apice obtusa ad summum breve apiculata. Petala ovato-oblonga 3 mm. longa 5 mm. lata apice obtusissime vel truncate obtusa basi ± cuneato-contracta margine obscure eroso-denticulata. Labellum 3-lobum, circ. 1 mm. longum 3 mm. latum basi contractum, lobis basilaribus (lateralibus) oblique oblongis a lobo centrali angulo 45° divaricatis semiovatis apice cuspidato-acuminatis 1½ mm. longis margine interiore rectis subintegris margine exteriore inferiore obscure erosodenticulatis basi rotundatis —-formiter recurvis, lobo centrali (terminali)

ORCHIDEÆ. 27

oblongo-rectangulari $\frac{1}{2}-\frac{2}{3}$ mm. longo $\frac{1}{3}-\frac{1}{2}$ mm. lato sursum latiore basi \pm contracto apice truncato-2-lobo, lobis triangularibus $\frac{1}{5}$ mm. longis acutis, sinibus inter lobos lobulo singulo rotundato minuto instructis. Labellum basi obscure disciferum basi medio subsaccato-impressum. Columna brevissima $\frac{1}{5}$ mm. longa basi valde constricta.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near O. arisanensis HAYATA; but differs from it by the very much smaller flowers with linear bracts which nearly surpass the flowers in length.

Liparis Rich.

Liparis dolichopoda Hayata sp. nov. (Tab. V.) = Cestichis dolichopoda Rhizoma in arborem repens teres 2½ mm. in diametro vaginis obtectum vel subnudum. Caulis cum racemis 23 cm. longus teres basi bulbosodilatatus basi 13 mm. in diametro basi vaginis obtectus vel subnudus, vaginis 5 cm. longis apice acutis partem bulbosam caulis amplectantibus. Folia basi racemi vel apice caulis 2-3-4 alternatim congesta, basi a caule articulatim soluta lanceolata 14 cm. longa 2 cm. lata apice obtusa basi plus minus angustata basi ad articulationem 7 mm. lata in exsiccato membranacea, venis parallelis utraque pagine elevatis. Racemi circ. 10 cm. longi cylindracei 2 cm. lati, pedicellis (cum ovariis) 5 mm. longis horizontaliter patentibus, bracteis lanceolatis acuminatis erectis 3 mm. longis, floribus a se 3-4 mm. remotis. Flores albescentes vel albo-virides. Sepala subæqualia oblonga 3½ mm. longa 1½ mm. lata apice obtusa basi non contracta æquilata. Petala linearia 3½ mm. longa ½ mm. lata apice obtusa basi æquilata ½ mm. lata. Labellum plus minus crassum obovatum 3 mm. longum 2 mm. latum valde recurvum medio subito angustatum apice bilobum, sursum prope apicem minute hirtellatum. Disci basi labelli breve 4- lamellati. Columna 2 mm. longa. Liparis longipes Schlecht. (non Lindl.) Matsum. et Hayata Enum. Pl. Formos. p. 404.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. B. HAYATA, Jan. 1912.

Near L. longipes LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. Vol. VIII. t. 37), but separable from it by the lips which are in this new species two-lobed at the apex. This species is that

orchid which was sent to R. Schlechter some years before and was sent back here by him with the name of *Liparis longipes* Lindl.

Liparis Kawakamii Hayata sp. nov. (Fig. 5.) Caulis (cum racemis) 23 cm. longus basi squamatus, squamis vaginiformibus 3-5 cm. longis 15 mm. latis apice acutis vel acuminatis, basi supra partem squamatam 2-foliatus. Folia oblanceolata sessilia 13 mm. longa 2 cm. lata apice acuto-obtusa basi attenuata, nervis manifestis 5, in vivo crassiuscula, in exsiccato submembranacea. Racemi terminales 18 cm. longi, rhachibus complanatis alatis, alis 1 mm. latis, pedunculis 10 cm. longis squamiferis, squamis cum bractea

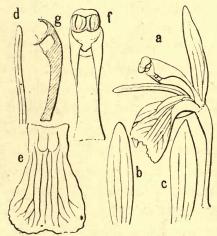


Fig. 3, Liparis Kawakamii HAYATA; a, a flower, one of the lateral sepals taken off; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a column; g, the same, in vertical section.

conformibus lanceolatis 8 mm. longis 1-2 mm. latis acuminatis a se 1 cm. remotis, partibus floriferis 5-6 cm. longis laxiuscule floratis, pedicellis 7 mm. longis gracilibus, ovariis 2 mm. longis 3 mm. latis, bracteis-lanceolatis 8 mm. longis acuminatis. Sepalum posticum lineari-5½ mm.longum angustatum 13 mm. latum apice obtusum basi non contractum approximatim 3-nervium, lateralia ± obliqua postico vix breviora. Petala angustissime linearia 6 mm. longa 1 mm. lata apice obtusa 1-nervia basi non contracta. Labellum cuneiforme 5 mm. longum apice 34 mm. latum apice latissi-

mum medio \pm contractum $2\frac{2}{3}$ mm. latum basi contractum $1\frac{1}{2}$ mm. latum apice truncatum denticulatum latere margine subintegrum latere infra medium sub erectum, basi medio discis collosis instructum. Columna recurva 4 mm. longa dorso complanata, utroque latere leviter alata, alis prope apicem columnæ \pm dilatatis.

HAB. Formosa: Loco non indicato; leg. T. KAWAKAMI.

Near L. Uchiyamæ Schlecht, but differs from it by the broader leaves and less prominent auricles at the apex of the column.

Liparis macrantha Rolfe, (Fig. 6) in Ann. Bot. IX. p. 156; Matsum. et Hayata Enum. Pl. Formos. p. 406. Hab. Kelung, Heichöshö, Mt. Arisan.

The orchid is rather widely distributed in the island. The type I have never seen. As far as the original description is concerned, our specimens may be referred to Rolfe's species.

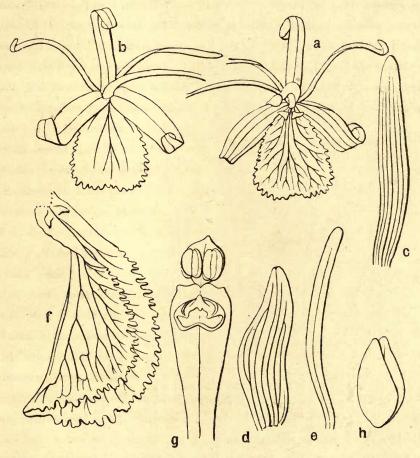


Fig. 6, Liparis macrantha Rolfe; a, a flower; b, the same, seen from back; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, a column, anther lifted; h, a pollinium.

Liparis Nakaharai Hayata (Fig. 7) Mater. Fl. Formos. p. 130. Caulis 2-foliatus inferne brevissime vaginatus, vaginis ovatis brevioribus superne gradatim elongatis. Folia 2 ad basin caulis sita oblanceolata cum petiolis 35 cm. longa 2 cm. lata racemum in longitudine æquantia apice

30 ORCHIDEÆ.

acuminata basi gradatim attenuata in petiolum 10 cm. longum abeuntia ima basi articulata multinervia utrinque glabra. Flores mediocres 2 cm. in diametro, in racemum laxe-floratum 15 cm. longum terminalem pedunculatum dispositi, pedunculis 18 cm. longis gracilibus erectis, bracteis lanceolatis 1 cm. longis. Sepala libera patentia linearia 9 mm. longa 1 mm. lata apice obtusa, posticum postice reflexum recurvatum, lateralia antice paralleliter patentia inferne recurvata. Petala linearia 9 mm. longa ½ mm. lata postice et inferne reflexa. Labellum cuneiforme in circumscriptione 8 mm. longum, 5½ mm. latum a medio antice curvatum apice latissime truncatum irregulariter denticulatum basi columnæ affixum, a medio basi erectum ima columnam

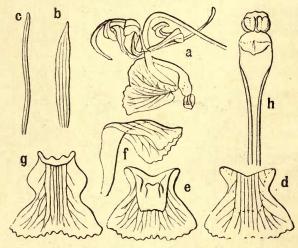


Fig. 7, Laparis Nalcaharai HANATA; a, a flower; b, a sepal; c, a petal; d, a lip; e, the same seen from back; f, the same, seen from side; g, the same seen from back; h, a column, anther lifted.

amplectans a medio superne patens elobatum basi 2-tuberculatum. Columna elongata 5 mm. longa semiteres.

Hab. Taitō, Manchōsha, leg. T. Tawakamı et G. Nakahara, Jan. 1906, (No. 766).

This is very distinct species; it is somewhat near *L. flaccida* in its habit, but very much different from it in having much larger lips, longer

pedicels and in many other points.

Liparis platybolba HAYATA (Fig. 8) sp. nov. Epiphyta. Rhizoma in arborem repens complanato-teres 2 mm. latum, radices a basi pseudobulbi gerentes. Pseudobulbi valde complanati oblongi vel ovato-oblongi vel elliptici 2½ cm. longi 2 cm. lati 7 mm. crassi glabri basi reliquis squamarum obtecti apice 2-foliati, foliis cum petiolis articulatis, petiolis subnullis in utroque latera pseudobulbi valde decurrentibus, partibus decurrentibus 25 mm. longis tenuibus sursum 4 mm. latis deorsum angustissimis ad nullum reductis. Folia ob-

lanceolata 14 cm. longa 28 mm. lata apice triangulari-acuta basi gradatim angustata 8 mm. lata ad petiolum subnullum abeuntia secus medium tenuiter plicata exsiccato membranacea vivo crassiuscula supra viridia ad costas tenuiter sulcata utroque latere costa 3-4 nervata, nervis et venis supra non visis, subtus pallidiora, costis elevatis, nervis tenuiter visis, margine integra circ. plana tenuissima. Scapi (racemi) ad apicem pseudobulbi terminales,

20-25 cm. longi complanati deorsum distincte alati cum alis 4 mm. lati a basi sursum usque ad 31 cm. longum nudi, plus sursum usque ad partem floriferam squamati, squamis inferioribus longioribus laxiusculis lanceolatis 21 cm. longis 4 mm. latis acuminatis remotiusculis, superioribus minoribus densiusculis ad bracteam abeuntibus. Pars florifera racemi 10-15 cm. longa tereto-angulata, bracteis lanceolatis acuminatis 6 mm. longis erectis, floribus densiusculis a se 3-7 mm. remotis, pedicellis 2 mm. longis, ovariis 3-4 mm. longis clavato-teretibus apice truncatis basi attenuatis, floribus subclausis 4 mm. longis. Sepalum posticum erectum lin-

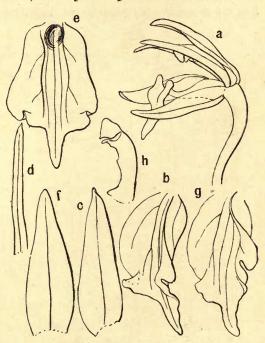


Fig. 8, Liparis platybolba HAYATA; a, a flower; f, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip seen from front; b, and g, the same, seen from side; h, a column, seen from side.

eari-oblongum 5 mm. longum 2 mm. latum apice obtusum basi haud contractum 2 mm. latum 1-nervium dorso carinato-costatum secus costas subplicato-concavum, lateralia cum postico conformia. Petala angustissime linearia 5 mm. longa ½ mm. lata erecta 1-nervia 1-costata basi non contracta vix vel haud dilatata apice obtusa haud reflexa. Labellum subpatens in explicato sub-rotundatum 4½ mm. longum 3¼ mm. latum apice cuspidatum, partibus cuspidatis elongato-triangularibus 1½ mm. longis basi 1-1½ mm. latis apice obtusis

desuper leviter recurvis, a infra partem cuspidatam deorsum rotundatum, partibus rotundatis (i.e. hypochilis) 3 mm. longis totiusque latis vel latioribus distincte 5-nerviis suberectis basi medio valde concavis utroque latere suberectis, glabrum inter partem cuspidatam (epichilum) et partem rotundatam (hypochilum) valde ad marginem undulato-plicatum, margine deorsum prope basin integerrimum sursum sub eroso-denticulatum vel subintegrum. Columna 2 mm. longa fere semiteres apice clavata usque ad supra basin angustata basin leviter

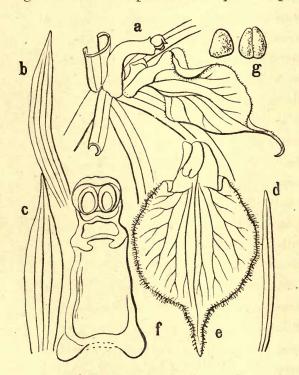


Fig. 9, Liparis Sasakii HAYATA; a, central portion of a flower; c, a dorsal sepal; b, a lateral sepal; d, a petal; e, a lip; f, a column; g, pollinia.

dilatata. Clinandrium valde concavum. Pollinia 4, per paria in loculis segregata Capsulæ racemosæ subsecundæ obovoideo-fusiformes apice clavatorotundatæ basi fusiformeattenuatæ 3-costatæ, inter costas 1-nervatæ, in sectione subcirculares, pedicellis 3 mm.longis. Cestichis platybolba Hayata in sched. Herb. Taihoku.

Hab. Arisan, inter Funkiko et Taroyen, leg. B. Hayata et T. Ito Mart. 1914.

Remarkable for the very much laterally compressed pseudobulbs.

Liparis Sasakii Hayata sp. nov. (Fig. 9.)

Epiphyta in trunco *Chamœcyparis obtusæ*. Caulis 8 cm. longus basi squamis multis obtectus, squamis ovato-rotundatis caulem amplectantibus 2 cm. longis totiusque latis vaginiformibus. Folia 2 fere sessilia obovata 5 cm. longa 2½ cm. lata apice obtusa vel rotundata deorsum angustata complete lateque caulem amplectantia. Scapi inter folia siti 7 cm. longi angulati,

ORCHIDEÆ. 33

partibus floriferis 2 cm. longis, bracteis cordato-cuspidiformibus 3 mm. longis basi latissimis 2 mm. latis apice subito angustatis cuspidatis ad summum obtusis, pedicellis 6 mm. longis, ovariis 2 mm. longis. Flores atro-purpurei. Sepalum posticum lineari-lanceolatum 13 mm. longum 3 mm. latum apice acuminatum basi cordatim auriculatum 3-nervium margine exteriore valde recurvum, lateralia postico æquiformia sed ± obliqua. Petala linearia 12 mm. longa 1 mm. lata apice obtuso-acuta basi non contracta margine exteriore vald recurva. Labellum rotundato-obovatum 1 cm. longum 6 mm. latum apice rotundatum ad centrum breve cuspidatum, (cuspidibus 1½ mm. longis basi 3 mm. latis elongato-triangularibus), margine ciliolatum versus longitudinem subplicatum infra medium abrupte desuper reflexum basi contractum breve minuteque auriculatum ad basin appendicula una elevata instructum. Columna 3 mm. longa utroque latere alata, alis ½ mm. latis.

HAB. Mt. Arisan, leg. S. SASAKI, 1913, Mai.

Near Liparis Henryi Rolff, but differs from it by the much smaller form, shortly caudate and ciliate lips and appendicules at the base of the lip.

Liparis Somai HAYATA sp. nov. (Tab. VI.) = Cestichis Somai HAYATA. Rhizoma Pseudobulbi ovoidei 4 cm. longi 2 cm. lati apice 2-foliati basi vaginis scariosis involucrati. Folia 2 oblanceolata vel spathulata 13 cm. longa 2 cm. lata apice obtusa basi attenuata plicata racemum amplectantia in exsiccato chartacea, venis parallelis utraque pagine elevatis. Racemi 15 cm. longi, pedunculis (partibus racemi non-floriferis) 5-6 cm. longis latere complanatis alatis cum alis 2 mm. latis, partibus floriferis dense floratis 10 cm. longis, pedicellis (exceptis ovariis) ascendentibus 3 mm. longis, bracteis lanceolatis 5 mm. longis 1 mm. latis apice acuminatis. Sepalum posticum lanceolatum 3 mm. longum 1 mm. latum apice obtusum basi haud contractum, lateralia valde obliqua oblique ovata 3 mm. longa 1½ mm. lata apice obtusa basi vix contracta. Petala linearia 22 mm. longa 1 mm. lata apice acuminata basi non contracta. Labellum ovatum 3 mm. longum 2 mm. latum apice triangulari-acutum ad summum obtusum basi cordatim contractum ad medium plicato-recurvum. Columna tenuis 13 mm. longa apice alata vel apice antice dentibus 2 instructa, dentibus obtusis minutis.

HAB. Kusukusu, leg. T. Sōma, Jan. 1912.

Near Liparis congesta, but differs from it in having larger leaves and flowers.

Liparis taiwaniana Hayata (Fig. 10, et Tab. VII.) Caulis brevissimus in pseudobulbum incrassatus 2-foliatus, vaginis brevioribus 5-6 instructus. Folia oblanceolata 18 cm. longa 17 mm. lata apice acuminata basi attenuata ima basi articulata 3-costata. Racemi ad apicem caulium laterales cum pedunculis 20 cm. longi folio æquilongi, partibus floriferis 8 cm. longis laxi-

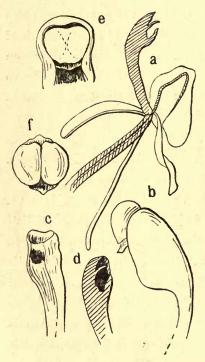


Fig. 10, Liparis taiwaniana HAYATA; a, a flower in vertical section; b, a column, seen from side; c, the same, seen from front, anther taken off; d, the same, in vertical section; e, apical portion of the column; f, an anther.

floratis, bracteis lanceolatis 7 mm. longis. floribus mediocribus 1 cm. in diametro. Sepala æqualia patentissima, exteriore valde reflexa recurva oblongo-linearia 1 cm. longa 13 mm. lata apice obtusa. Petala angusto-linearia 1 cm. longa 1 mm. lata sursum margine convoluta teretia apice obtusa postice reflexa. Labellum ad basin columnæ, basi erectum a medio sursum patens, ima basi auriculatum, obovatum in circumscriptione 8 mm. longum apice dilatatum 7 mm. latum versus basin angustatum basi 21 mm. latum margine latere integrum apice inæqualiter denticulatum lobis lateralibus obscuris, supra basin 2-tuberculatum. Columna 6 mm. longa semiteres 2-alata apice incurvata.

Hab. Nantō: Randaizan, leg. T. Kawakami et U. Mori, Jan. 1908, (No. 6309).

This is near L. plicata and L. Uchiyama, but distinguishable from them

by the longer and more slender column of the flowers. The columns of the other species are very much shorter. Also very near *Liparis viridiflora* L., but differs from it in having larger flowers and in the lips with obscure lobes.

ORCHIDEÆ. 35

Liparis Uchiyamæ Schlecht. (Fig. 11) in lit. Matsum. Ind. Pl. Jap.

II-1, p. 235. Compared with a co-type of this species.

Hab. Rinkiho, ad 4000 ped. alt., leg. H. Inaba, Juli. 1911.

This is perhaps the same species as L. plicataFr. etSav.

OreorchisLINDL.

Oreorchis
Fargesii FINET
var. subcapitata HAYATA
(Fig. 12) Ic. Pl.
Formos. II. p.
142. Terrestris,
pseudobulbis

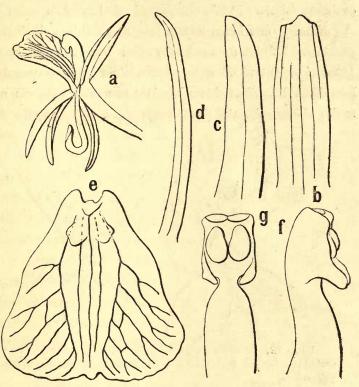


Fig. 11, Liparis Uchiyamæ Schlecht:; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, a columna, seen from side; g, the same, seen from front.

3-4 nodosis ovoideis $1\frac{1}{2}$ cm. longis 1 cm. latis apice rostratis basi rotundatis ad nodos squamis obtectis. Folia duo terminalia basi vaginis involucrata lineari-lanceolata, (excepte petiolum) 30 cm. longa 12 mm. lata apice acuminata basi attenuata ad petiolum 5 cm. longum abeuntia membranacea nervoso-plicata, cum petiolis articulata. Scapi e nodis juxta terminalem oriundi quam foliis breviores 20-25 cm. longi 3-4 nodosi ad nodos vaginati vaginis 4 cm. longis, laminis acutis, partibus floriferis brevibus 2 cm. longis floribus dense subcapitatim dispositis, pedicellis gracilibus (cum ovariis) 8 mm.-10 mm. longis, bracteis lanceolatis 4 mm. longis. Sepala sub-patentia subæqualia, posticum lanceolatum 11 mm. longum $2\frac{2}{3}$ mm. latum apice obtusum basi plus minus angustum obscure 5-nervium, lateralia quam postico latiora oblique ovato-

lanceolata 9 mm. longa 3½ mm. lata distincte 5-nervia apice obtusa basi leviter contracta falcata. Petala oblique oblongo-lanceolata quam sepalis lateralibus angustiora 10 mm. longa 30 mm. lata apice obtusa distincte 5-nervia minute punctata. Labellum cuneato-obovatum basi unguiculatum, (cum unguibus 1½ mm. longis) 8 mm. longum 3 mm. latum ex apice unguis 3-lobatum, lobis lateralibus linearibus 2 mm. longis ½ mm. latis 1-nerviis apice obtusis, lobo medio oblongo-obovato 6 mm. longo 3 mm. lato margine denticulato-cristato,

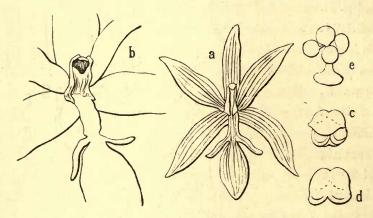


Fig. 12, Oreorchis Fargesii Finet var. subcapitata Hayata; a, a flower; b, central portion of the same; c, an anther; d, the same, seen from back; e, pollinarium.

5-nervio facie parse punctato-cristato basi medio 1-lamellato-appendiculato, appendiculo plicato lineari 1 mm. longo. Columna brevis 2 mm. longa leviter alata basi auriculata in pedem brevissimum producta.

Hab. Mt. Rontabun, leg. U. Mori, Aprili., 1910.

Near O. Fargesii Finer, in Bull. Soc. Bot. Fr. (1896) XLIII. p. 697, Pl. XIII.; but differs from the type in having lips with oblong middle lobes, much shorter column and punctate petals.

Dendrobium Sw.

Dendrobium erythroglossum Hayata sp. nov. (Fig. 13, a) Caulis gracilis teres 30–40 cm. longus 1 mm. in diametro sectionis ramosissimus, internodiis 2–3 cm. longis cylindricis, ad nodos reliquis vaginarum fibrosis instructus hac atque illac tumido-dilatatus, partibus dilatatis fusiformibus 2 cm. longis 2½ mm, latis, sursum vaginis foliorum obtectus, vaginis cum internodiis

aquilongis cylindricis ore truncatis nervosis. Folia ad ramos superiores alternatim sita linearia 5 cm. longa 3 mm. lata apice obtusissima ad centrum breve mucronata, in exsiccato membranacea, basi subito contracta cum vaginis articulata. Racemi laterales 2–3 cm. longi pauci-florati sæpe 1–florati basi 1–2-vaginati, vaginis cylindraceis 5 mm. longis, bracteis hyalinis ovatis pedicellum amplectantibus, pedicellis cum ovariis $1\frac{1}{2}$ cm. longis. Flores rubes-

centes 31 cm. in diametro. Sepalum posticum ovato-lanceolatum 33 mm. longum 8 mm. latum apice acuminatum basi leviter contractum margine deorsum exteriore recurvum ± convexum 7-nervium, lateralia lineari-lanceolata basi obliqua latere inferiore 33 mm. longa latere superiore 28 mm. longa apice acuminata basi latissima 8 mm. lata medio 5 mm. lata basi cum pede columnæ connata mentum 6 mm. longum formantia. Petala ovatorhomboidea 33 mm. longa cum sepalo æquilonga 15 mm. lata apice triangulariacuminata basi cuneata 5-nervia margine integra ad basin 3 mm. lata. Labellum cum sepalo petaloque æquilongum 33 mm. longum 18 mm. latum ovato-rhomboideum apice cuspidato-acutum basi cuneatum margine (exceptis partibus basilaribus) serrulato-denticulatum a medio usque ad basin crassiusculum cæterum tenue facie ubique breve hirsutum 3-lobum,

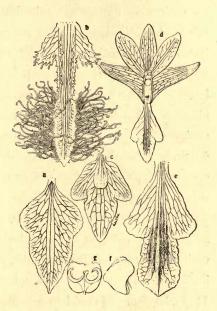


Fig. 13, a, a lip of Dendrobium erythroglossum Hayata; b, a lip of Dendrob. fimbriatolabellum Hayata; c, a lip of Dendrobium heishanense Hayata; d, a flower, lip taken down to show a gland at the base of the kin; e, a lip; f, an operculum; g, the same, lifted up; a, c, natural size, others more or less magnified.

lateralibus (basilaribus) semirotundatis suberectis brevibus, lobo terminali majusculo triangulari-ovato 17 mm. longo 16 mm. lato apice breve cuspidato-acuto basi vix vel haud contracto. Columna 2 mm. longa totiusque lata basi in pedem 6 mm. longum 3 mm. latum producta. Anthera oblonga 3 mm. longa breve hirsuta, filamentis filiformibus 2 mm. longis.

HAB. Formosa: Loco non indicato; cult. in seminario Taihoku, leg. R. KANEHIRA, Juni. 1912.

Dendrobium fimbriatolabellum HAYATA sp. nov. (Fig. 13, b) = Desmotrichum fimbriatolabellum HAYATA in sched. herb. Taihoku. Caulis 40-60 cm, altus teres ramosissimus, internodiis 1½-2 cm. longis subclavatocylindricis 7 mm. in diametro, ad nodos subnudus vel subsquamatus nitidus in exsiccato flavescens subsulcatus, ramis basi angustatis sursum plus minus dilatatis sursum plus ramosis, internodiis terminalibus majoribus circ. 3 cm. longis clavatis apice dilatatis circ. 9 mm. in diametro sectionis. Gemmæ ad apicem rami geminæ vel fasciculatæ divaricatæ elongato-conicæ 1 cm. longæ. Folia ad apicem ramulorum sita cum nodis articulata oblonga oblongoelliptica vel ovato-oblonga 10 cm. longa 3½ cm. lata apice rotundata ad centrum obscure leviter emarginata basi rotundato-contracta ad petiolum 4 mm. longum abeuntia supra nitida in exsiccato subcoriacea vivo coriacea crassiuscula, nervis principalibus circ. 11 utraque pagine elevatis, venis inter nervos circ. 3, margine desuper ± recurva, petiolis plicatis 4 mm. longis 3 mm. latis cum nodis articulatis, vaginis nullis. Racemi breves 1½ cm. longi ad apicem ramulorum siti pauciflorati, bracteis multiseriatis scariosis ovato-lanceolatis 3-5 mm. longis acuminatis, pedicellis cum ovariis 11cm. longis gracilibus, floribus subalbescentibus 1½ cm. longis. Sepalum posticum lineari-lanceolatum 1½ cm. longum 3½ mm. latum apice acuminatum 5-nervium basi non contractum plus minus concavum vel subplanum, lateralia lineari-lanceolata 1½ cm. longa 3 mm. lata apice acuta plus minus obliqua basi dilatata 5 mm. lata cum pede columnæ affixa mentum 3 mm. longum formantia 5-nervia. Petala linearia 1½ cm. longa 1½ mm. lata apice acuta basi non contracta Labellum lineare (exceptis partibus fimbriatis) 1½ cm. longum 2½ mm. latum apice acutum basi cuneatum 3-lobum, lobis lateralibus (basilaribus) oblongis angulo 45° lobo centrali divaricatis 4 mm. longis 13 mm. latis margine fimbriatis, fimbriis 1 mm. longis linearibus, lobo centrali lineari 12 mm. longo 2 mm. lato basi apiceque ± dilatato, parte dilatata superiore oblonga 7 mm. longa 3 mm. lata apice apiculato-acuta margine prope apicem integra cæterum valde fimbriata, fimbriis filiformibus 1½ cm. longis 10 mm. latis 1-nerviis angulo recto a lobo centrali divaricatis, medio subintegrovel crenulato, discis medio a basi usque ad partem dilatatam superiorem 2-lamellatis instructum, lamellis circ. 10 mm. longis 1 mm. latis margine undulato-crispatis, 5-nervium basi integrum. Columna 3 mm. longa basi ad mentum 3 mm. longum producta.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, 1912, Juli.

Flowers of this new orchid are somewhat near to those of *Desmotrichum* spurium J. J. SMITH, *D. angulatum* Blume and *D. criniferum* KRÄNZL, (in Pfl.-reich. IV. 50, II. B. 21, p. 347, fig. 35 A-H.); but the branches are totally different.

Dendrobium furcatopedicellatum HAYATA sp. nov. (Fig. 14). Caulis

teres rectus 40-30 cm. longus 2 mm. in diametro sursum foliatus a medio deorsum non foliatus vaginis foliorum obtectus. Folia linearia circ. 11 cm. longa 4 mm. lata apice acuminata basi æquilata vel leviter contracta 3-nervia membranacea in exsiccato tenuiter coriacea. vaginis tubiformibus 31 cm. longis internodio vix longioribus caulem firme obtegentibus. Cymæ laterales 2floratæ, pedunculis 13 mm. longis, basi

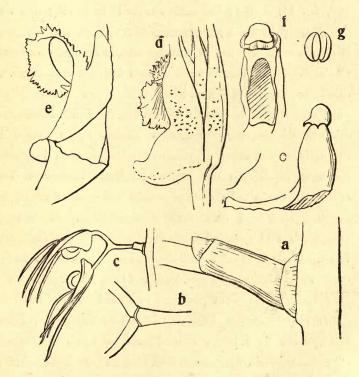


Fig. 14, Dendrobium furcato-pedicellatum HAYATA; a, basal portion of a peduncle; b, basal portion of pedicels; c, inflorescence; d, basal portion of a flower, showing purple dots in the petals and sepals; e, the same, sepals and petals taken off, to show the labellum, articulation of the same and mentum; e, mentum and column; f, a column, stigma, rostellum, clinandrium and anther are seen; g, two pollinia, each of which is divided into two.

40 ORCHIDEE.

bracteis tubiformibus 1–2 instructis, pedicellis 10 mm. longis a se angulo 80° egressis. Flores subclausi non patentes 30 mm. longi. Sepala erecta lanceolato-linearia flavescentia medio extus purpreo-maculato-punctata; posticum 30 mm. longum deorsum lanceolatum sursum lineare revoluto-filiforme, supra basin latissimum $3\frac{1}{2}$ mm. latum, lateralia postico æquilonga leviter latiora basi obliqua cum pede columnæ connata mentum 5 mm. longum formantia, mento antice \pm recurvo. Petala sepalo æquilonga angustiora. Labellum 3–lobum margine fimbriato-denticulatum, disco piloso.

Hab. Maisha, leg. B. Hayata et S. Sasaki, Aug. 1912.

Near D. biflorum SWARTZ (PFITZER, in Pfl.-reich. IV. 50, II. B. 21. p. 168, fig. 11, A-D.); but differs from it in having lips with pilose discs.

Dendrobium heishanense HAYATA sp. nov. (Fig. 13, c). Epiphyta. Rhizoma ramosa tenue in truncos arboris repens, caulibus approximatim sitis. Caulis 30-40 cm. longus teres sursum latissimus deorsum minus latus basi ± dilatatus medio 4-5 mm. latus basi supra partem dilalatam 2 mm. latus, partibus dilatatis conicis 5 mm. longis 6 mm. latis, radicibus sub parte dilatata dense sitis, internodiis mediis 3½ cm. longis, inferioribus clavatis subnudis, superioribus cylindricis vagina obtectis, vaginis cylindricis cum internodiis æquilongis ore truncatis. Folia lanceolata 6 cm. longa 8 mm. lata apice acuminata vel obtuso-attenuata basi contracta basi tortuosa in exsiccato tenuiter chartacea cum vaginis articulata. Racemi laterales ad nodos superiores siti brevissimi dense florati, bracteis basi imbricatis ovato-triangularibus valde concavis scariosis 3-5 mm. longis, pedicellis 18 mm. longis gracilibus, ovariis brevissimis 2 mm. longis 1½ mm. latis. Flores albo-rosei 2-2½ cm. in diametro. Sepalum posticum ovato-oblongum 18 mm. longum 6 mm. latum apice obtuso-acutum basi ± contractum 5-nervium, lateralia oblique ovatotriangularia 2 cm. longa basi 1 cm. lata apice obtuso-acuta basi cum pede columnæ connata mentum 8 mm. longum ± -formiter recurvum formantia 5-nervia. Petala oblonga 18 mm. longa 6 mm. lata apice obtusa basi cuneata manifeste 3-nervia vel obscure 5-nervia. Labellum late rhomboideum 17 mm. longum 13 mm. latum ad basin contractum ad apicem menti affixum 3-lobatum, lobis lateralibus (basiralibus) triangularibus 4-3 mm. longis erectis apice obtusis, lobo terminali triangulari-oblongo 10 mm. longo 7 mm. lato apice

ORCHIDEÆ. 41

triangulari-obtuso basi leviter vel vix contracto. Labellum medio infra lobum terminalem callo uno instructum, callo rotundato 2–3 mm. in diametro, lobis lateralibus facie breve hirsutis, cæterum glabrum. Columna brevissima 1 mm. longa basi ad pedem valde concavum sacciformem latissimum 10 mm. longum (in explicato) 7 mm. latum producta.

Hab. Arisan: inter Heishana et Nimandaira, ad 7000 ped. alt., leg. B. Hayata, Aprili., 1914.

This is near *Dendrobium candidum* Wall. in Ann. Roy. Bot. Gard. Calc. V. t. 19, in the broad concave mentum, in the size of the flowers and discs; but in other respects it is altogether different.

Dendrobium kwashotense HAYATA sp. nov. (Fig. 13, d-g, et fig. 15). Caulis secus rhizoma approximatim situs 40-50 cm. longus basi pseudobulboso-dilatatus, pseudobulbis globoso-conicis 2-3-nodosis 7 mm. latis totiusque longis subnudis, parte supra pseudobulbos angustata tereti, partibus angustatis 2-3 cm. longis 5 mm. latis teretibus 1-2-nodosis, parte supra partem angustatem fusiforme-dilatata, partibus fusiformibus 5-10 cm. longis 1\frac{1}{2}-2 cm. in diametro profunde 8-sulcatis 8-costatis 3-4-nodosis nudis, parte supra partem fusiformem complanata, partibus complanatis 10-25 cm. longis cum vaginis 7-9 mm. latis 6-8-nodosis, internodiis complanato-clavatis 2-3 cm. longis a vaginis perfecte obtectis, parte supra partem complanata tereti, partibus teretibus 10-15 cm. longis 3-4 mm. in diametro subnudis, internodiis 21-3 cm. longis. Folia ovato-oblonga 6 cm. longa 23 mm. lata valde coriacea apice obtusissima ad summum brevissime inæqualiter 2-loba, lobo longiore 1 mm. longo apice obtuso, lobo breviore subnullo, basi subrotundata cum vaginis articulata, vaginis complanato-cylindraceis 2 cm. longis 7 mm. latis ore truncatis, supra nitida, nervis venis paucis prominente elevatis, subtus venis multis minus prominente tenuissime elevatis, margine desuper recurva. Flores ad nodos superiores lateraliter subsolitarii vel pauce racemosi, pedicellis (cum ovariis) 2 cm. longis teretibus validiusculis 2 mm. in diametro, basi vagina singula instructis, vaginis cylindricis 6 mm. longis 2½ mm. in diametro scariosis nervosis apice 5-4-lobatis, lobis triangularibus 2 mm. longis acutis. Flores apertientes 5 cm. in diametro. Sepalum posticum lanceolatum 23 mm. longum 6 mm. latum apice obtusum basi non contractum,

margine sursum interiore recurvum 5–7-nervum, lateralia lanceolata triangularia latere inferiore 3 cm. longa latere superiore 2 cm. longa apice obtusa basi 13 mm. lata 7-nervia margine sursum interiore recurva. Petala lanceolata 12 mm. longa $6\frac{1}{2}$ mm. lata, apice acuto-obtusa basi contracta obscure 7-nervia. Labellum obovato-oblongum 28 mm. longum 24 mm. latum apice breve acutum basi longe cuneatum multinervium tenuiter 3-lobum, lobis



Fig. 15, Dendrobium kwashotense H_{AYATA} , photographed by Mr. T. Soma.

basiralibus (lateralibus) semioblongis a basi labelli usque ad apicem loborum lateralium 11 cm. longis, ex apice loborum usque ad sinus intra lobos laterales et lobum terminalem 2 mm. longis apice truncatis, lobo terminali oblongo 11 cm. longo circ. 1 cm. lato apice apiculato basi ± contracto margine crenulato-denticulato. Disci medio a

basi usque ad medium labelli 3-striatim siti, striis deorsum crassiuscule lamellatis sursum cristato-tuberculatis. Columna subnulla 4 mm. lata basi ad mentum 14 mm. longum 3 mm. latum planum crassum 3-nervium producta, mentis sursum prope apicem disco singulo instructis, disco flabelliformi substipitato 3 mm. lato 1 mm. longo flavo, stipite 3 mm. longo toto connato.

Hab. Kwashōtō, leg. T. Sōma, Juni. 1913.

Dendrobium leptocladum Hayata n. n. Dendrobium tenuicaule Hayata (non Hook. f.) Mater. Flor. Formos. p. 316.

As D. tenuicaule is given to an Indian orchid, another new name D. leptocladum should be given to this Formosan species.

Dendrobium longicalcaratum HAYATA sp. nov. (Tab. VIII). Epiphyta. in arbores crescens. Caulis foliiferus circ. 15 cm. longus, internodiis 1 cm. longis vaginis obtectis, vaginis quam internodiis longioribus scariosis obconicocylindraceis hyalinis nervosis ore truncatis. Folia lanceolata 35 mm. longa 6-7 mm. lata apice acuminata basi contracta in exsiccato membranacea. Racemi ad apicem internodii laterales circ. 3 cm. longi 1-2-3-floriferi, bracteis triangularibus 6 mm. longis 5 mm. latis apice acutis 3-nerviis, rhachibus flexuosis purpureis, pedicellis 1 cm. longis, ovariis 3 mm. longis. extus leviter purpurea rubescentia 5-nervia, nervis purpureis, intus alboviridescentia. Petala alba. Sepalum posticum triangulari-oblongum 15 mm. longum 7 mm. latum apice acuto-obtusum margine ad apicem incurvum basi leviter contractum; lateralia valde obliqua, partibus supra insertionem ovarii lineari-oblongis vel oblongis 13 mm. longis 6 mm. latis apice acuto-obtusis, partibus infra insertionem ovarii 15 mm. longis quam iis supra insertionem longioribus 4 mm. latis cum pede columnæ connatis mentum 15 mm. longum 4 mm. latum cylindricum formantibus, mente apice obtuso. Petala oblique apice obtusa basi angustata lanceolato-oboyata 14 mm. longa 5 mm. lata ad insertionem 24 mm. lata 5-nervia. Labellum elongatospathulatum basi cum mentum connatum, a basi sursum liberum longe unguiculatum cum unguibus 27 mm. longum 6 mm. latum, ungue 22 mm. longo lineari circ. 3 mm. lato basi cum mentum connato hac atque illac contracto margine ubique interiore plicato apice margine exteriore plicato constricto, parte supra constrictionem (lamina) ovata 9 mm. longa 5 mm. lata apice rotundato-obtusa. Discus apice et medio unguis situs 2-lamellatus. Columna supra insertionem brevissima 2 mm. longa, pede longissimo 18 mm. longo.

Hab. Urai, Aug. 1912, leg. B. Hayata et S. Sasaki; fl. Nov. 1912 in horto botanico Tōkyō.

Very near Dend. Victoria-reginæ Loher and D. subclausum Rolfe (Kränzl. in Pfl,-reich. IV. 50, II. B, p. 11, fig. 6, A-G).

Dendrobium moniliforme Sw. Compared with a specimen of the species in the Tōkyō herbarium.

Hab. Arisan, inter Taroyen et Funkiko, leg. B. Hayata et T. Ito, Mart. 1914.

The form of the lips is subject to some mutability. It is ovate to rhomboidal, obtuse or acute at the apex, very much hirsute or nearly glabrous;

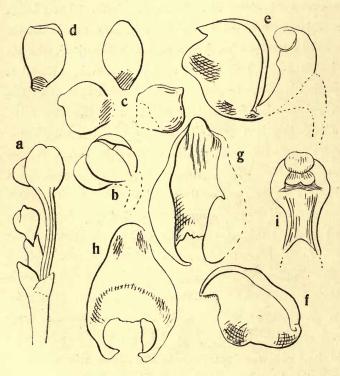


Fig. 16, Dendrobium pendulicaule HAYATA; a, inflorescence; b, a flower-bud; c, sepals; d, a petal; e, a flower, sepals and petals taken off, to show the lip, cross lines show yellowly tinted portions; f, a lip, seen from side; g, the same, seen from front; h, the same, seen from below; i, a column and foot; yellow maculations on the lip are crossed.

and the callosities at the base of the lips are in one specimen very prominent, but in another very faint.

Dendrobium pendulicaule HAYA-TA sp. nov. (Fig. 16) = (Aporom pendulicaule HAYATA in Herb. Taihoku Museum). Epiphyta; caulis cæspitosus, a summo ramorum arborisaltissimæ verticaliter pendulus 30-50 cm. longus lateraliter valde compressus, cum foliis 7 cm. latus viridissimus toto foliosus longitudine Folia disglaber. ticha equitantia firme

plicata (in exsiccato membranacea) plicato semi-oblonga (explicato oblonga) 5 cm. longa plicato 1½ cm. lata, explicato 26 mm. lata, explicato 10-nervia basi

cum vaginis articulata, vaginis imbricatis 3–4 cm. longis firme caulem obtegentibus. Racemi pauciflorati laterales, bracteis minutis. Flores circ. 4 mm. longi albicantes. Sepala oblonga, lateralia quam postico latiora. Petala sepalo conformia. Labellum subsaccatum vel valde concavum apice valde sinuatum flavo-maculatum basi disco 3-striato hirsuto instructum. Capsula cylindrica circ. 10 cm. longa 8 mm. lata.

Hab. Kusukusu, leg. B. Hayata et S. Sasaki, Juli., 1912.

Found hanging perpendicularly from a branch of a very tall tree, swinging to and fro even with a very gentle breeze.

Bulbophyllum THOU.

Bulbophyllum (Cirrhopetalum) flavisepalum HAYATA (Fig. 17) Ic.

Pl. Formos. II. p. 131. rhizomati-Epiphyta, bus repentibus radicantibus teretibus 2 mm. in diametro sectionis, pseudobulbis ovoideis 2 cm. longis 1 cm. latis apice obtusis truncatis 1foliatis. Folia elongatoangustato-oblonga 7 cm. longa 17 mm. lata apice rotundata basi attenuata cum pseudobulbis articulata margine leviter recurva supra viridia subtus pallidiora crassiuscula supra plana, venis exsiccato) utroque latere

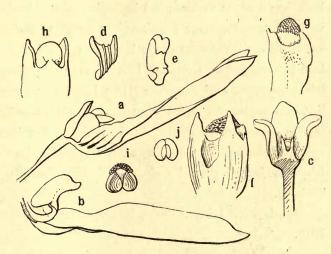


Fig. 17, Bulbophyllum flavisepalum HAYATA; a, a flower, seen from side; b, the same, a sepal, labellum, and mentum are seen, others are taken off; c, the same lateral sepals, labellum and mentum taken off, seen from face, clumna is seen; d, a labellum seen from face, elevated discus lines are seen; e, mentum and labellum, seen from below; f, columna, seen from face; g, the same, seen side; h, the same, seen from back; i, an anther; j, pollinia, two smaller, the others larger.

8-9, utraque pagine conspicuis. Scapi floriferi e latere pseudobulborum, aphylli 5-4 cm. longi, graciles vaginis tenuibus 3-4 instructi, vaginis inferioribus imbricatis, superioribus remotis ore obliquis acutis 6 mm. longis. Flores

5-10 flavescentes 1 cm. in longo diametro laxe umbellati rhachibus 2 mm. longis, pedicellis gracilibus 9-10 mm. longis basi 1-bracteatis, bracteis fuscopurpurascentibus 3 mm. longis. Sepala valde inæqualia, posticum liberum minus rubro-purpurascens ovato-quadrangulare 3½ mm. longum basi 2½ mm. latum 3-nervium basi latissimum leviter contractum apice obtusum lateralia valde longiora linearia 13 mm. longa 3 mm. lata 3-nervia sed basi 5-nervia flava nervis rubescentibus, apice obtusa basi plus minus obliqua basi columnæ pede adnata mentum 2 mm. longum formantia supra basin introrse tortuosa latere exteriore a se cohœrentia facie exteriore basi 3-linearimaculata. Petala breviora quam sepalo postico oblonga 3 mm. longa 13 mm. lata apice rotundata 3-nervia fusco-purpurascentia leviter reflexa vel concava. Labellum brevius mentum in longitudine æquans basi erectum a medio sursum valde extrorse recurvum crassiusculum margine erectum apice obtusum acutum vel emarginatum medio discis linearibus 1 vel 2 instructum 2 mm. longum basi purpurascens. Columna brevissima 1½ mm. longa apice (clinandrium) latere bicornuta basi in pedem 2 mm. longum producta, (pede interiore recurvo lineari complanato) apice abrupte incurvis dilatatis. Anthera globosa, 4 mm. in diametro. Pollinia 4; 2 majora, 2 minora. Capsula prematura cylindrico-fusiformis 2 cm. longa 5 mm. lata apice obtusa basi attenuata triquetra facie leviter 1-costata. Cirrhopetalum flavisepalum HAYATA Herb. Taihoku.

Hab. Mt. Arisan, prope Taroyen, leg. B. Hayata et S. Sasaki, Jan., 1912.

The orchid was found creeping on a large stone at a sunny place on the left side of the Arisan-road near Taroyen.

Bulbophyllum gracillimum HAYATA (Fig. 18) Ic. Pl. Formos. II p. 132. Epiphyta, caulibus gracillimis prostratis ad nodos radicantibus, teretibus $\frac{2}{3}$ mm. in diametro sectionis, internodiis 1–2 cm. longis, ad nodos vaginatis, vaginis 3 mm. longis ore truncatis. Folia subsessilia crassa elliptica vel elongato-elliptica 22 mm. longa 9 mm. lata apice rotundata mucronata vel emarginata basi plus minus contracta ad petiolum 1–2 mm. longum abeuntia multinervia. Racemi axillares 1–2-florati 2 cm. longi graciles basi vaginati vaginis 1–2 mm. longis, basi pedicellorum 1–bracteati, bracteis ovatis acumi-

natis 3 mm. longis 1½ mm. latis, pedicellis cum ovario 2-3 mm. longis. Sepala inæqualia, posticum oblongo-angustatum 3 mm. longum 1¼ mm. latum apice

obtusum basi non contractum nervium, lateralia basi pede columnæ adnata basi valde obliqua 3-nervia 3 mm. longa. Petala minutislinearia sima 11 mm. longa 1nervia. Labellum 11 mm. longum 1 mm. latum basi erec-

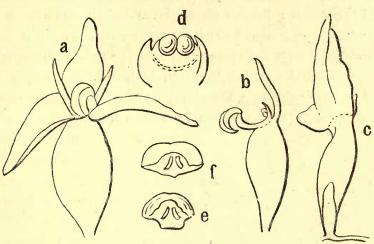


Fig. 18, Bulbophyllum gracillimum HAYATA; a, a flower; b, the same, seen from side, showing the columnal foot and lip; c, the same, seen from back; d, polinia on the clinandrium; e, and f, apercula.

tum interiore recurvum medio sursum abrupte exteriore recurvum medio marginis valde transverse repando-plicatum. Discus 3-lamellatus. Columna brevissima latere antice breve cornuta, basi in pedem $1\frac{1}{3}$ mm. longum producta, cum sepalis mentum formans.

Hab. Nöközan, leg. T. Kawakami et U. Mori, Jan., 1908.

Bulbophyllum Inabai Hayata sp. nov. (Tab. IX.) Cirrhopetalum Inabai Hayata. Rhizoma repens teres 1mm. in diametro. Pseudobulbi ovoidei circ. 1cm. longi 5-6 mm. lati. Folia oblanceolata vel elongato-oblonga 5 cm. long 8mm. lata apice obtusa ad summum mucronata basi ± attenuata in exsiccato tenuiter chartacea, supra venis lateralibus parallelis tenuiter elevatis, subtus pallidissima. Scapi 2½ cm. longi apice flores 5-10 umbellato-racemosim gerentes, bracteis basi pedicellorum sitis lanceolatis scariosis 1½ mm. longis, pedicellis 4 mm. longis. Sepalum posticum lanceolatum 3½ mm. longum 1½ mm. latum apice caudato-acuminatum basi non contractum, lateralia obliqua triangularilanceolata 5 mm. longa basi 2 mm. lata sursum attenuata margine convoluta, dua firme margine interiore se attingentia basi cum pede columnæ connata.

48 ORCHIDEÆ.

Petala obovata 2 mm. longa 1½ mm. lata apice rotundata vel leviter retusa basi leviter cuneata basi 1 mm. lata. Labellum lineare 2 mm. longum ½ mm. latum crassum deorsum utroque latere auriculiforme sursum teretiforme apice retusum. Columna 1 mm. longa apice antice 2-cornibus instructa, cornibus aristæ-formibus rectis; pede 1 mm. longo angulo recto recurvo.

Hab. Maisha, leg. H. Inaba, 1911, Juli.

Bulbophyllum kusukusense Hayata sp. nov. (Fig. 19) Epiphyta. Rhizoma in arbores repens teres 2½ mm. in diametro, reliquis vaginarum

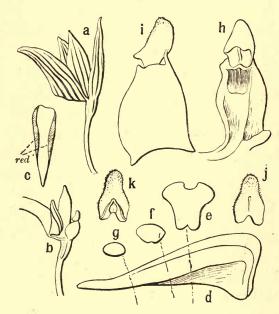


Fig. 19, Bulbophyllum kusukusa HAYATA, a a flower; b, the same of the petals and petals taken off, showing the column, columnal foot, and the lip. c, a lip, shaded portions tinted red; d, a lip; e, f, and g, sections of the same; h, and the column, seen from front; i, the same seen from side; i, k, an anther seen from different sides.

A and b, natural size; others variously magnified; red portions on the lip are shaded.

fibrosis multis obtectum, infra partem insertionis folii radices filiformes subincrassatas abundante emittens. Pseudobulbi cylindrici 2-4 cm. longi 5-3 mm. in diametro (in exsiccato), apice folium unum gerentes. Folia crassa oblongo-linearia 10-15 cm. longa 13-23 cm. lata apice obtusa ad summum retusa breve 2-lobata basi gradatim attenuata ad petiolum circ. 1 cm. longum abeuntia supra nitida viridissima pallidissima supra ad costam subplicata, subtus costis acute elevatis, venis parallelis (in exsiccato) supra elevatis utroque latere costæ 9-10, subtus non visis margine integerrima tenuissima. Scapi 1-florati, basi pseudobulbi oriundi 5 cm. longi gracillimi basi bracteis

4-5 scariosis vaginatis instructi. Flores subalbi circ. 2 cm. longi, sepalis petalisque purpureo-striatis. Sepala inequalia, posticum ovato-oblongum 17 mm.

longum 5-6 mm. latum apice acutum basi 5 mm. latum 5-nervium 5-purpureostriatum, lateralia oblique oblonga postico latiora basi cum pede columnæ
connata. Petala sepalo minus lata lanceolata 17 mm. longa 4-5 mm. lata
apice acuta 5-nervia purpureo-striata. Labellum crassissimum triangulari-lineare
9 mm. longum 1½ mm. latum subplicatum flavum ad marginem rubro-maculatum,
maculis linearibus. Columna 3 mm. longa basi ad pedem 4 mm. longum
lineare producta. Operculum cuspidato-cordatum 2 mm. longum dorsofacieque toto glanduloso-cristatum.

HAB. Kusukusu, Juni. 1912, leg. B. HAYATA et S. SASAKI. Very near *Bulbophyllum affine* LINDL., but differs from it by the more elongate anthers and in other points.

Bulbophyllum melanoglossum HAYATA sp. nov. (Tab. X.) = Cirrhopetalum melanoglossum HAYATA. Radices filiformes crispatæ subincrassatæ sub pseudobulbo e rhizomate fasciculatim oriundæ. Rhizoma in saxa arboresque repens teres 1½ mm. in diametro. Pseudobulbi ovati 1 cm. longi 6 mm. lati. Folia olongato-elliptica crassa 3½ cm. longa 7 mm. lata apice rotundata ad centrum retusa basi subito attenuata ad petiolum 2-3 mm. longum abeuntia supra nitida viridia subtus pallidissima, venis parallelis utraque pagine non visis. Scapi a basi pseudobulbi oriundi 9 cm. longi gracillimi basi 1-2 bracteis vaginiformibus instructi, ad apicem flores circ. 10 sub-umbellatim gerentes. Flores circ. 10 ad apicem scapi subumbellatim dispositi, pedicellis 6 mm. longis gracillimis basi bracteis lanceolatis 2 mm. longis instructis. subpurpurei 12 mm. longi. Sepala inæqualia, posticum cum petalis firme imbricatum gleam formans intus valde concavum ovatum 4½ mm. longum 2½ mm. latum apice acuminatum margine longe ciliatum 5-striatum atro-purpureum, lateralia lanceolato-linearia 1½ cm. longa 2 mm. lata purpurea margine integra haud ciliolata ± convoluta dua se firme margine interiore paralleliter attingentia. Petala oblique oblonga purpurea 3 mm. longa 1 mm. lata apice obtuse acuta basi truncata non contracta 14 mm. lata margine anteriore subrecta margine posteriore rotundata, margine tota longe ciliata, ciliis 1 mm. longis. Labellum cornuforme 23 mm. longum utroque latere basi auriculis instructum erassum medio profunde sulcatum atropurpureum. Columna subrecta vel \pm recurva 11 mm. longa antice leviter et tenuiter 2-alata, alis apice ad cornua

linearia 1 mm. longa productis, pede angulo recto recurvo circ. 3 mm. longo, parte inferiore cum petalis et sepalis connata, parte superiore libera sursum recurva, apice cum labello articulato.

HAB. Formosa; loco non indicato, cult. in seminario Taihoku.

Bulbophyllum omerandrum HAYATA sp. nov. = Cirrhopetalum omerandrum HAYATA. Rhizoma in arbores repens teres 12 mm. in diametro vaginis scariosis obtectum. Pseudobulbi elongato-ovati 13 mm. longi 6 mm. lati apice ± attenuati reliquis fibrosis vaginarum obtecti. Folia lineari-oblonga 6½ cm. longa 12 mm. lata apice obtusissima ad centrum retusa crassa in exsiccato coriacea, venis lateralibus parallelis utraque pagine leviter elevatis, basi subito in petiolum attenuata, petiolis 8 mm. longis intus profunde sulcatis. Scapi circ. 10 cm. longi basi vaginis scariosis instructi, vaginis 10-12 mm. longis ore obliquis, apice flores 2-3 racemosim gerentes, bracteis sub pedicello plicatoconcavis 1 cm. longis, pedicellis 17 mm longis. Flores subfulvescentes, petalis apice purpurascentibus, labello flavescenti. Sepalum posticum ovatum 13 mm. longum 6½ mm. latum 5-nervium apice obtusum ad summum cilio uno 2 mm. longo instructum basi non contractum 6 mm, latum margine sub lente minute crenulatum, lateralia oblique ovato-lanceolato-linearia 2 cm. longa 5 mm. lata apice obtusa basi plus minus contracta 5-nervia. Petala oblique oblonga 6 mm. longa 3 mm. lata apice obtusissima basi non contracta margine fimbriato-ciliata 3-nervia. Labellum liguliforme 7 mm. longum basi 2 mm. crassum. Columna brevissima 3 mm. longa antice subalata, alis apice ad cornua unguiformia productis, pede columnæ 5 mm. longo superne recurvo. Anthera apice pectinato-ciliata.

Hab. Mt. Arisan: Heishana, 6000 ped. alt., leg. B. HAYATA et TAKEO Itō, 1914, Mai.

Remarkable for the pectinately ciliate anthers.

Bulbophyllum uraiense Hayata sp. nov. (Tab. XI.) Rhizoma teres 4 mm. in diametro. Pseudobulbi ampulliformes $2\frac{1}{2}$ cm. longi 8 mm. lati apice \pm attenuati ad summum truncati reliquis squamarum obtecti. Folia crassa oblonga vel oblongo-linearia 10 cm. longa $4\frac{1}{2}$ cm. lata apice rotundata vel obtusa basi subito acuta attenuata ad petiolum $2\frac{1}{2}$ cm. longum abeuntia in exsiccato coriacea, venis lateralibus parallelis utraque pagine

(in exsiccato) tenuiter elevatis, petiolis intus profunde sulcatis. Scapi folio longiores 16 cm. longi basi approximatim imbricatimque squamosi, sursum remotissime squamati vel haud squamati, apice flores 5–10 umbellatim gerentes, pedicellis 1 cm. longis basi bracteis 5 mm. longis lanceolatis scariosis instructis. Sepalum posticum ovato-lanceolatum 2 cm. longum 5 mm. latum valde concavum sursum lineari-acuminatum 5–nervium basi±contractum 2 mm. latum margine integrum; lateralia lineari-lanceolata 5 cm. longa 3 mm. lata basi cum pede columnæ connata a medio sursum convoluta lineari-filiformia subteretia. Petala oblique recurvato-oblonga 6 mm. longa 3 mm. lata apice obtusa margine superiore convexa recurva margine inferiore concava recurva integra 3–nervia apice ad centrum mucronata. Labellum lineare valde recurvum 4 mm. longum 2 mm. crassum. Columna brevissima 1 mm. longa antice 2–alata, alis apice ad cornua linearia 2 mm. longa apice obtusa productis, pede apice libero cum labello articulato.

Cirrhopetalum uraiense HAYATA in sched. herb. Taihoku.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near Cirrhopetalum boninense Makino in Somokuzusetsu XVIII. t. 20.

Bulbophyllum viridiflorum HAYATA (Fig. 20) Ic. Pl. Formos. II. p. 133. Epiphyta, pseudobulbis ovoideis 2 cm. longis 1 cm. latis 1-foliatis. Folia crassiuscula solitaria elongato-oblonga 3-5 cm. longa 10-12 mm. lata apice obtusa ad centrum acuta basi contracta ad petiolum 5 mm. longum abeuntia supra viridia ad costas impressa, subtus elevata pallidiora. Scapi sub pseudobulbo, aphylli 6 cm. longi descendenti-recurvi basi 2-3-vaginati (vaginis imbricatis 7 mm. longis apice plus minus dilatatis ore obliquis) inferiore 1-vaginati, (vaginis dilatatis 12 mm. longis 8 mm. latis basi contractis apice dorso cuspidato-acutis,) uniflorati apice gradatim ad ovarium abeuntes. Flores solitarii apertientes 5 cm. in diametro pallido-viridescentes. Sepala valde inæqualia, posticum oblongo-ovatum 28 mm. longum 14 mm. latum apice obtusum basi leviter contractum 5 mm. latum 7-nervium, lateralia valde obliqua ovata 23 mm. longa 18 mm. lata apice obtusa basi leviter contracta cum pede columnæ connata mentum 1 cm. longum formantia 9-nervia. Petala cum sepalo postico conformia minora 23 mm. longa 11 mm. lata apice subacuta vel obtusa basi leviter contracta 5-nervia. Labellum basi erectum a medio recurvato-patens 15 mm. longum totiusque latum inferiore latere

membranaceum a medio sursum spongioso-crassum rugosum medio 1-sulcatum apice viridescens minute rubro-punctatum apice subacutum vel obtusum margine

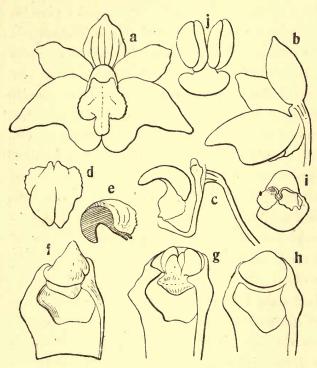


Fig. 2O, Bulbophyllum viridiflorum HAYATA; a, a flower, seen from front; b, the same, seen from side; c, the same, sepals and petals taken off, columna, mentum and labellum are seen; d, a labellum, seen from front, basal appendages are seen; e, the same, seen from side, medially cut, section-face shaded, minute red dots mentioned at the apex, basal appendages and claw are seen; f, columna; g, the same, operculum taken off, 4 pollinia and translucent body seen; h, the same, anther taken off, clinandrium and stigma are seen; i, an operculum, seen from below; j, pollinarium.

inferiore eroso-denticulatum sursum integrum basi appendiculatum, appendiculis retrorsis brevissimis 2-lobatis. brevissime unguiculatum cum pede columnæ articulatum. Columna brevissima vel nulla basi ad pedem producta, pede 2 cm. longo 4 mm. lato a basi usque ad medium cum sepalis connato, sed a medio sursum libero angulo 90° inflexo apice leviter concavo ad summum contracto cum ungue labelli articulato. Pollinia 4 sessilia. Ovarium breve 6 mm. longum.

Hab. Mt. Arisan, leg. B. Hayata et S. Sasaki Jan., 1912.

Flowered in May in a green house of the Koishikawa Garden, in February, 1912. It was brought back to the Garden by myself from Mt. Arisan. It was found on a large trunk of a *Quercus* at Nimandaira. Very distinct for the comparatively large flowers of greenish colour.

Ione LINDL.

Ione Sasakii HAYATA (Fig. 21) Ic. Pl. Formos. II. p. 139. Epiphyta,

rhizomate repenti tereti 1½ mm. in diametro sectionis, pseudobulbis remotis elongato-ovoideis 1 cm. longis 3–4 mm. latis apice attenuatis basi contractis 1–foliatis. Folia solitaria oblongo-linearia 5 cm. longa 7 mm. lata apice rotundata ad centrum emarginata vel breve 2–lobata basi attenuata cum bulbis articulata crassiuscula. Flores racemosi, racemis sub pseudobulbo sitis paucifloratis 3 cm. longis nodosis, interdodiis 5 mm. longis ad nodos 1–vaginatis, vaginis inferioribus 1 cm. longis tubuliformibus, superioribus laminatis, laminis apice acuminatis, sub floris singulis 1–bracteatis, bracteis ovatis 1 cm. longis 5 mm. latis apice acuminatis vel acutis basi leviter contractis, pedicellis (cum ovariis) 1 cm. longis. Flores patentes. Sepala subæqualia elongato-

triangularia vel elongato-ovata, postieum 10 mm. longum 4½ mm. latum apice acutum vel acuminatum basi contractum 5-nervium, lateralia angustiora et longiora quam iis posticis 11 mm. longa 4 mm. lata apice acuminata basi cum pede columnæ connata

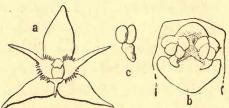


Fig. 21, Ione Sasakii HAYATA; a, a flower; b, a columna; c, a pollinarium.

latere superiore basi angularia (angulis acutis), latere inferiore basi rotundata. Petala elongato-cuspidato-triangularia 7–8 mm. longa basi latissima 3 mm. lata non contracta apice lineari-cuspidata, (cuspidibus linearibus crassiusculis) margine inferiore denticulato-ciliata. Labellum cuspidato-rotundatum 5 mm. longum 3 mm. latum apice longe cuspidatum, (cuspidibus linearibus 4 mm. longis), basi abrupte contractum cum pede columnæ articulatum 3–nervium valde concavum basi ad medium 2–lamellato-appendiculatum. Columna fere nulla, basi in pedem $2\frac{1}{2}$ –3 mm. longum producta, pede cum sepalis lateralibus mentum formanti.

Hab. Mt. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Near I. intermedia King et Pantling, in Ann. Roy. Bot. Gard. Calc. VIII. t. 210; but differs by much acuminate or even caudate segments of the perianth. It was collected and sent to me by Mr. S. Sasaki with flowers preserved in alcohol, upon which the above description is based. It was also collected by myself, in January, this year, in the woods near Nimandaira in Mt. Arisan and was brought

back to the Koishikawa Garden where it flowered, in August, 1912, in open air. Sketches are drawn from living specimens.

Eria LINDL.

Eria arisanensis Hayata sp. nov. (Tab. XII.) Rhizoma in arbores repens. Pseudobulbi secus rhizoma approximatim siti elongato-ovati plus minus recurvi 14-2 cm. longi 5-7 mm. in diametro apice 2-foliati. Folia 2 ad apicem pseudobulbi sita oblongo-linearia 5 cm. longa 1 cm. lata apice obtusa basi angustata ad insertionem 4 mm. lata in exsiccato chartacea. Racemi ad apicem pseudobulbi siti 5 cm. longi 4-5 florati fusco-tomentosi, bracteis lanceolato-ovatis 8 mm. longis 31 mm. latis apice acuminatis, pedicellis cum ovariis 8 mm. longis breve hirsutis. Sepalum posticum lanceolatum 10 mm. longum 3 mm. latum apice acuminatum basi plus minus contractum margine interiore recurvum 5-nervium, lateralia obliqua falcato-oblongo-triangularia 10 cm. longa basi latissima 5 mm. lata eum pede columnæ mentum 5 mm. longum formantia falcato-recurva 5-nervia. Petala lanceolata 3-nervia 10 mm. longa 2 mm. lata apice acuta basi non contracta. Labellum obovatospathulatum 11 mm. longum 6 mm. latum apice rotundatum vel leviter emarginatum basi attenuato-cuneatum apice 3-lobatum, lobis lateralibus oblongotriangularibus 2 mm. longis 1½ mm. latis apice obtusis, versus centrum falcatis, lobo centrali rotundato 3 mm. longo totiusque lato crassiusculo botryoideo-tuberculato. Discus a medio usque ad basin labelli situs 2-3-lamellatus. Columna 3 mm. longa basi ad pedem 5 mm. longum producta.

Hab. in monte Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912. Fl. in horte betanice Tōkyō.

Very near Eria reptans Mk. (Eria japonica Max.); but distinguishable from it in many points.

Eria hypomelana Hayata sp. nov. (Fig. 22). Epiphyta. Pseudobulbi ovato-cylindrico-fusiformes 3 cm. longi 7 mm. lati squamis scariosis ovatis obtecti sursum approximatim 3-4-foliati. Folia oblanceolata vel lanceolata 8½ cm. longa 1 cm. lata coriacea viridia nitida apice acuminata basi longe attenuata ad extremitatem dilatata 5 mm. lata. Racemi ad axillas foliorum superiorum 6 cm. longi, pedunculis 2 cm. longis, floribus laxiuscure dispositis a se 1 cm. remotis, rhachibus tomentosis, bracteis tomentosis ovatis 1

cm. longis 5 mm. latis apice acutis margine minute denticulatis, pedicellis 8 mm. longis, ovariis 6 mm. longis tomentosis. Flores cinereo-viridi-flavi, purpureo-striati semiclausi non patentes. Sepalum posticum oblongum 11 mm. longum 4 mm. latum basi leviter contractum apice obtusissimum 5-nervium 5-purpureo-striatum; lateralia oblique oblongo-triangularia 11 mm. longa basi latissima 6 mm. lata apice obtusissima basi latissima basi pede columnæ connata 5-nervia purpureo-striata. Petala oblongo-lanceolata 9 mm. longa 3 mm. lata apice obtusa basi contracta 3-nervia purpureo-striata.

Labellum in circumscriptione
obovatum 9 mm.
longum in explicatio 6 mm.
latumapice truncato-emarginatum basi cuneato-contractum
3-lobatum, lobis
lateralibus semi-

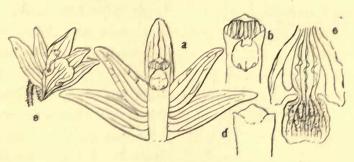


Fig. 22, Erla hypomelana Hayaya; e a, flower; a, a flower, explicated, lip taken off; c, a lip; b, upper portion of a column; d, the same, seen from back.

oblongis 5 mm. longis 2 mm. latis erectis columnam subamplectantibus, lobo terminali late subreniformi 3 mm. longo 4 mm. lato apice emarginato basi contracto ad basin 2½ mm. lato crassiusculo botryoideo-tuberculato, sinibus inter lobum terminalem et lobos laterales obtusis axe labelli transverse sitis. Discus ad medium labelli 2-lamellatus, lamellis 4-5 mm. longis. Labellum subtus nigro-atro-purpureum margine flavum, supra medium flavescens, lamellis discorum purpureis. Columna recta erecta 6 mm. longa 2 mm. lata subalata, pede 4 mm. longo 2 mm. lato.

Hab. Mt. Arisan, inter Funkiko et Taroyen, ad 5000 ped. alt., in arbores repens, leg. B. Hayata et T. Itō, Mart., 1914.

Near E. arisanensis HAYATA, but differs from it in having much larger leaves, pseudobulbs and flowers.

Eria plicatilabella Hayata sp. nov. (Fig. 23). Caulis pauci-ramosus vaginatus, vaginis late cylindricis 1½ cm. longis 8 mm. latis apice obtusis vel

obtusissimis nervosis scariosis ore oblique truncatis imbricatis. Folia versus apicem caulis conferta lineari-lanceolata 18 cm. longa 18 mm. lata apice acuminato-attenuata ad summum obtuso-mucronata basi gradatim angustata supra basin leviter contracta ad basin \pm dilatata 9-nervia, nervis utraque pagine elevatis, basi cum petiolis articulata, petiolis brevissimis 3 mm. longis latissimis caulem semi-amplectantibus. Racemi axillares 10 cm. longi ferrugineotomentosi tota longitudine bracteati, partibus floriferis 8 cm. longis, rhachibus

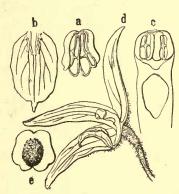


Fig. 23, Eria plicatilabella HAYATA; a, a flower; b, a lip; c, a column; d, an operculum; e, the same seen from back.

tomentosis, bracteis ovatis apice acutis 6 mm. longis $2\frac{1}{2}$ mm. latis reflexis subglabris, pedicellis brevissimis 2 mm. longis tomentosis, ovariis 3–4 mm. longis sursum latioribus tomentosis. Sepalum posticum oblongo-lanceolatum 7 mm. longum $2\frac{1}{2}$ mm. latum apice obtusum basi non vel vix contractum 3–nervium extus tomentosum intus glabrum, lateralia oblique oblonga 7 mm. longa $2\frac{1}{2}$ vel 3 mm. lata apice obtusa basi pede columnæ adnata mentum 2 mm. longum formantia extus tomentosa intus glabra 3–nervia. Petala oblique lineari-lanceolata $6\frac{1}{2}$ mm. longa 2 mm. lata 3–nervia glabra apice obtusa basi

vix contracta. Labellum oblongum $3\frac{1}{2}$ mm. longum $1\frac{1}{2}$ mm. latum apice cuspidatum glabrum margine minute ciliolatum dimidium inferius re erectoplicatum dimidium superius descendento-plicatum apice cuspidatum basi auriculato-rotundatum ad extremitatem valde contractum ad contractionem 2^{1} 0 mm. latum. Columna 2 mm. longa \pm recurva basi ad pedem anteriore recurvum 2 mm. longum producta.

Hab. Formosa: loco non indicato, cult. in Taihoku seminario, leg. B. Hayata, Mart., 1914, (fl).

Near E. tomentiflora HAYATA, but differs from it by the longer and thinner leaves, and by the much larger flowers.

Eria septemlamella Hayata sp. nov. (Fig. 24). Radices e basi pseudobulbi oriundæ incrassatæ. Pseudobulbi ellipsoidei 3-4 cm. longi 18 mm. lati squamis lanceolatis 2-5, 2-10 cm. longis obtecti. Folia 2 ad apicem

pseudobulbi sita oblanceolata circ. 30 cm. longa 5 cm. lata plus minus obliqua apice acuminata basi longe attenuata plicata basin scapi amplectantia in exsiccato membranacea, nervis et venis parallelis utraque pagine elevatis. Scapi 20 cm. longi, pedunculis 6 cm. longis, partibus floriferis 14 cm. longis racemosis densiuscule floriferis, floribus subdescendentibus, pedicellis (cum ovariis) 1 cm. longis, bracteis minutis. Sepalum posticum lineari-angustatum

12 mm. longum basi latissimum 3 mm. latum apice obtusum 3-5nervium, lateralia valde obliqua triangularioblonga desuper recurva 1 cm. longa basi latissima 6 mm. lata apice obtusa 5-nervia. Petala linearia ± recurva 11 mm. longa 2 mm. lata 5-nervia apice obtusa. Labellum ad apicem pedis columnæ articulatum ovato-rhomboideum 9 mm. longum 6 mm. latum subplicatum columnam semi-amplectans medio desuper recurvum basi cuneatum sursum 3-lobum, lobo

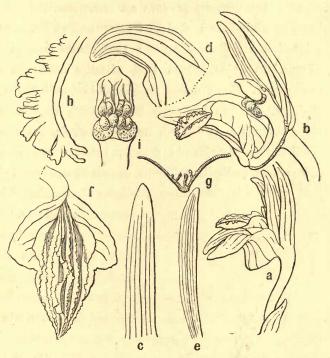


Fig. 24, Eria septemlamella HAYATA; a, a flower; b, the same, a lateral sepal taken off, to show the lip, mentum and columna; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, cross section of the same, to show the lamellate discs; h, a lamellate disc; i, apical portion of a columna, anther lifted.

terminali oblongo-triangulari $3\frac{1}{2}$ mm. longo 3 mm. lato apice obtuso facie lamellis 7 instructo, lamellis undulato-crispatis, mediis 3 mm. longis circ. 1 mm. latis, lobis lateralibus semi-oblongis erectis columnam semi-amplectantibus $2\frac{1}{2}$ mm. longis vel latis. Disci 7-lamellati, lamellis a basi labelli usque ad basin lobi terminalis sitis 3 non crispatis. Columna 3 mm. longa, pede 5 mm. longo. Pollinia 8.

Hab. Rinkiho, 1911, Aug., leg. H. INABA.

Near E. Corneri Reichb. f., but differs from it by 7 lamellate discs on the terminal lobe of the lips; also near E. fragrans Reichb. f. (Ann. Roy. Bot. Gard. Calc. VIII. t. 168), but, distinguishable from it in having smaller flowers with lips with 7 lamellate discs.

Phreatia LINDL.

Phreatia Morii Hayata sp. nov. (Fig. 25). Epiphyta. Caulis foliatus basi pseudobulbosus 2–3 cm. longus basi 1 cm. latus basi squamis 1–2 involucratus. Folia ad apicem pseudobulbi gemina lanceolata 10 cm. longa 17 mm. lata apice obtusa basi plicatim attenuata cum vaginis articulata crassiuscula. Scapi a basi pseudobulbi oriundi 30 cm. longi graciles deorsum vaginati, partibus vaginatis 20 cm. longis, vaginis 13 mm. longis 3 mm. latis apice obliquis a se 4–5 cm. remotis scariosis, partibus floriferis 10 cm. longis spiciformibus densiuscule floratis, bracteis ovatis 5 mm. longis 2 mm. latis apice acutis, pedicellis subnullis, ovariis 2½ cm. longis obovoideis apice truncatis basi attenuatis. Sepalum posticum triangulari-oblongum 2½ mm. longum

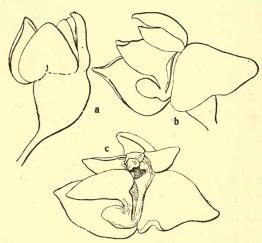


Fig. 25, Phreatia Morii HAYATA; a, a flower; b, the same, expanded; c, the same, petals expanded, showing the column, operculum, columnal foot and lip.

2 mm. latum apice obtusum basi latissimum valde concavum glabrum 1-nervium, lateralia oblique triangulari-oblonga concava 3 mm. longa basi latissime 21 mm. lata apice obtusa 1-nervia Petala ovato-oblonga glabra. $2\frac{1}{2}$ mm. longa $1\frac{1}{2}$ mm. lata apice obtusa 1-nervia glabra. Labellum erectum oblongo-triangulare 2 mm. longum 1 mm. latum apice acutum basi abrupte truncato-contractum ad unguem 1 mm. longum totiusque latum abeuns, ungue basi pede colum-

næ connato calcar breve sacciforme 3 mm. longum formanti. Columna subnulla 3 mm. longa basi in pedem circ. 2 mm. longum producta; dimidium pedis cum sepalis lateralibus connatum, dimidium liberum apice cum basi unguis labelli connatum sacculum formans; rostellum 2-lobum, lobis acuminatis; anthera late triangulari-rotundata $\frac{2}{3}$ mm. longa; pollinia 8.

HAB. Loco non indicato, leg. U. Mori, 1910.

Near *Phreatia nebularis*, *P. saccifera* and *P. elegans*; but it does not accord with neither in the shape of the leaves, pseudobulbs and flowers.

Phajus Lour.

Phajus gracilis Hayata (Fig. 26) Mater. Fl. Formos. p. 322. Caules 40–50 cm. longi, racemis a basi caulium emergentibus. Folia elongata plicata

in petiolum longum contracta, laminis obovato-oblongis 20 cm. longis 61 cm. latis apice obtuse acuminatis basi distincte contractis, petiolis 2-3 cm. longis basi vaginatis, vaginis 8 cm. longis striatis. Racemi cum pedunculis 30 cm. longi erecti graciles, partibus floriferis 8 cm. longis laxifloratis, bracteis oblongo-lanceolatis 13 cm. longis, floribus majusculis 3½ cm. longis (præter ovarium). Sepala libera patentia, posticum angustatum 3½ cm. longum 1 cm. latum utrinque obtusum, lateralia postico breviora oblonga 3 cm. longa 1 cm. lata apice plicato-acuta basi obliqua latere inferiore obscure auriculata, Petala sepal opostico angustiora spathulata 3 cm. longa 6 mm. lata apice obtusa basi attenuata. Labellum erectum cucullatum 28 mm. longum 25 mm. latum (expanso) basi in calcar rectum 1 cm. longum productum 3-lobatum, lobis lateralibus amplis erectis columnam involventibus apice undulatis, lobo medio expanso latiore 14 cm. lato 8 mm. longo

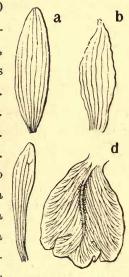


Fig. 26, Phajus gracilis HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, a lip.

patenti margine undulato apice emarginato-2-lobulato prope basin lamellatotuberculato, lamellis medio incrassatis hirsutis cæterum glabris. Columna longiuscula 2 cm. longa 2-alata apice clavata, alis latioribus.

HAB. Köshün: Botansha, leg. G. NAKAHARA, Dec. 1906, (No. 788).

Phajus undulatomarginata HAYATA sp. nov. (Fig. 27.) Terrestris. Pseudobulbi ovato-fusiformes 2½-3 cm. longi 8 mm. lati apice attenuati basi rotundati apice 2-3-foliati. Folia lanceolata 20 cm. longa 3½ cm. lata apice

acuminata basi attenuata ad petiolum vaginiformem abeuntia, nervis manifestis 3, exsiccato membranacea indigo-colorata, vaginis 10 cm. longis. Scapi

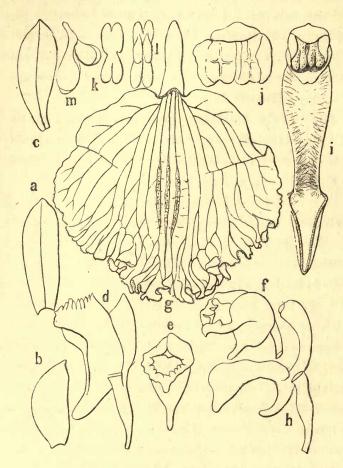


Fig 27, Phajus undulatomarginata HAYATA; a, a dorsal sepal; b, a lateral sepal; c, a petal; d, e, f, a lip, seen from different sides; g, a lip, unfolded; b, a column with a lip and spur; i, a column with a basal portion of a spur; j, an operculum lifted, seen from front; k, pollinia, seen from front; l, the same, seen from back; m, the same, seen from side; a—f, and h, nearly natural size; others variously magnified.

aphylli 25 cm. longi vaginati, vaginis 3 cm. longis 6-7 mm. latis apice acutis, partibus floriferis 8 cm. longis, bracteis obovatis 11 cm. longis 1 cm. latis apice acuminatis basi amplexicaulibus. Sepalum posticum angustatooblongum 3 cm. longum 1cm.latum apice obtusum basi leviter contractum 4 mm. latum, lateralia postico latiora obliqua 12 mm. lata breviora 21 cm. longa 7 - nervia. Petala oblanceolata vel obovato-spathulata 3 cm. longa 1 cm. lata deorsum cuneato - attenuata ad basin 2 mm.lata 7-nervia. Label-

lum explicato late rotundatum $2\frac{1}{2}$ cm. latum totiusque longum apice subemarginatum basi contractum, ad orem calcaris 3 mm. latum, lobis lateralibus amplis erectis semioblongis 2 cm. longis 8 mm. latis margine latere integris

non plicatis, margine anteriore valde plicato-undulatis ad lobum centralem gradatim abeuntibus lobo centrali brevissimo obscuro apice emarginato margine valde undulato-plicato, facie medio discis 3–5-striatis hirsutis instructum basi medio hirsutum calcaratum, calcari circ 8 mm. longo 2 mm. lato vel latiore intus hirsuto. Columna 1½ cm. longa 2 mm. lata 2-alata intus dense hirsuta. Rostellum validiusculum semirotundatum antice productum apice rotundatum.

HAB. Shintengai, leg. R. KANEHIRA, Mai., 1912.

Somewhat near *Phajus maculata* Lindl. (Ann. Roy. Bot. Gard. Calc. VIII. t. 149) in the shape of the lips which are undulately plicate at the margin, but greatly different from it in having much smaller form, lanceolate leaves with long petioles.

Tainia BLUME.

Tainia cordifolia Hook. f. in Hook. Ic. Pl. XIX. t. 1861; HAYATA et MATSUM. Enum. Pl. Formos. p. 410.

Tainia Fauriei Schlecht. Fedd. Rep. IX. 1911, p. 282.

HAB. in montibus Kusshaku, leg. U. FAURIE, 1903 (No. 539).

Schlechter's *Tainia Fauriei* is the same species as a plant mentioned in our work as *Tainia cordifolia* Hook. f., as it was collected by the same collector at the same place and distributed with the same number. At Kew, I compared my plant with the type of this species, and found it to be identical with the same.

Tainia unguiculata HAYATA sp. nov. (Fig. 28) = Tainiopsis unguiculata HAYATA in sched. Herb. Tokyo. Radices incrassatæ; rhizoma subrepens ascendens ramosum teres in exsiccato 4 mm. in diametro, internodiis 7-10 mm. longis, ad nodos squamis unis instructis, squamis ovatis scariosis 3-4 cm. longis 2 cm. latis apice acuminatis basi rhizoma amplectantibus. Folia ad apicem rhizomatis rami solitaria longe petiolata lanceolata (duplicato-plicata) 25 cm. longa 6-7 cm. lata apice acuta vel acuminata basi longe attenuata 5-nervia, nervis parallelis, intra nervos 6-vena, venis parallelis, in exsiccato membranacea, petiolis 5 cm. longis apice cum laminis folii articulatis teretibus multisulcatis basi cum rhizomate articulatis. Scapi ad apicem rami rhizomatis solitarii vel gemini circ. 10 cm. longi vaginis scariosis ovatis obtecti, vaginis apice acuminatis 2-3 cm. longis quam internodio longioribus. Flores solitarii vel pauci-racemosi, bracteis ovatis

acuminatis 21 cm. longis alabastrum floris amplectantibus, pedicellis 5 mm. longis, ovariis 1 cm. longis linearibus gracilibus 1 mm. in diametro sulcatis. Flores patentes 4 cm. longi totiusque lati. Sepalum posticum oblongoobovatum 23 mm. longum 10 mm. basi fere latum haud contractum, sepala lateralia magna oblique triangularia latere superiore 2 cm. longa latere inferiore 3-4 cm.

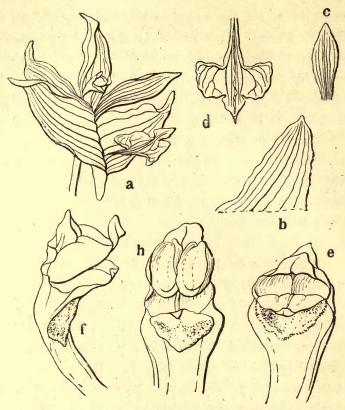


Fig. 28, Tainia unguiculata HAYATA; a, a flower, expanded; b, a detached lateral sepal; c, a petal; d, a lip; e, apical portion of a column; f, the same, seen from side; h, the same, seen from front, anther lifted;

longa basi $2\frac{1}{2}$ cm. lata apice acuta basi cum pede columnæ connata mentum 2 cm. longum formantia, latere superiore libera, latere inferiore basi se connata calcar 7 mm. longum 4 mm. latum formantia. Labellum ad orem calcaris situm liberum longe unguiculatum, unguibus linearibus 9 mm. longis 4 mm. latis sursum ad laminam expansum, lamina crusiformi 3-lobata 2 cm. lata $1\frac{1}{2}$ cm. longa, lobo terminali triangulari-ovato 6 mm. longo 5 mm. lato apice triangulari-acuto ad summum cuspidato-acuto basi leviter contracto ad basin 3 mm. lato, lobis lateralibus divaricatis rectangulari-auriculiformibus 8 mm. latis totiusque longis. Discus medio labelli 1-lamellatus, lamella circ. 2 cm. longa crassiuscula. Columna circ. 10 mm. longa 2 mm. lata subalata

apice dilatata circ. $3\frac{1}{2}$ mm. lata nuda, basi in mentum $2\frac{1}{2}$ cm. longum producta, stigmate triangulari. Rostellum triangulare, latere clinandrii ultra insertionem antherarum producto. Anthera ovata 2-locularis cum appendice 4 mm. longa, appendice connectivi antice producto, sessilis dorso 2-cucullata.

HAB. Formosa: loco non indicato: cult. in seminario, Taihoku.

Near Tainia cordifolia HOOK. f.; but differs by the much broader sepals, unguiculate lips, and much narrower lanceolate leaves.

It is with some hesitation that I have referred this plant to Tainia. bears some resemblance to Tainia and Acanthephippium in its terrestrial habit, large membraneous plicate petiolate leaves, few-large-flowered short lateral racemes, and in having lateral sepals adnating to the foot of the column, erect petals, footed column and 8 pollinia. Besides, it resembles the former more affirmatively by the long slender column with wings towards the apex and solitary leaves; while its affinity with the latter is more emphasized by the short lateral sheathed raceme, lateral sepals adnating to the long foot of the column to form a large pouch-like spurred mentum, mobile small stipitate lips with broad incurved lateral lobes and a small triangular terminal lobe, and long footed column. But it differs from Tainia on one hand by the short few flowered sheathed raceme, lateral sepals adnating to the long foot of the column to form a large pouch-like spurred mentum, mobile small stalked lip with broad incurved lateral lobes and a small triangular terminal lobe, and by long footed column; while on the other it is distinguishable from Acanthephippium by the long slender column winged towards the apex, solitary leaves, not fleshy flowers, and free sepals. Upon considering all the characters above mentioned, I am very much inclined to regard the plant as representing a new genus, Tainiopsis, just intermediate between the two named genera. What is rejected from one genus is accepted by the other, and vice versa. The two (Tainia and Acanthephippium) may be united to one and the same genus, when the characters which separate each other are connected by the one represented by this new orchid; or the three may be regarded as distinct. In my opinion, however, the new genus Tainiopsis should be regarded as a valid one, so long as the two (Tainia and Acanthephippium) should stand as distinct ones.

Pleione Don.

Pleione formosana Hayata Mater. Fl. Formos. p. 326. Cologyne formosana Hayata in sched. herb. Taihoku. Descriptio auctata. Pseudobulbi ampullæformes apice rostrati cum rostris 3 cm. longi 17 mm. lati basi globosi, partibus globosis 17 mm. in diametro, partibus rostratis 1 cm. longis ½ cm. latis apice truncatis. Sepala petalaque purpureo-rosea. Labellum album versus discos maculatum. Pedunculi 20 cm. longi, fructus singulos gerentes. Capsula elavato-cylindrica ± 3 cm. longa 8 mm. lata apice abrupte truncata basi cuneato-attenuata 6-costata inter costas profunde sulcata, pedicellis 1 cm. longis.

Hab. Senninbora, in Mt. Arisan, ad 6000 ped. alt., leg. B. HAYATA et T. Itō, Mart., 1914.

Pholidota LINDL.

Pholidota uraiensis Hayata sp. nov. (Fig. 29) Rhizoma repens sub-

teres 2 mm. in diametro, squamis scariosis dense obtectum, squamis 8-10 mm. longis deorsum vaginiformibus rhizoma complete amplectantibus apice acutis venosis se imbricatis. Pseudobulbi ascendentes 1-nodosi ovoidei apice truncato-obtusi basi rotundati ± leviter tenuissime complanati 2 cm. longi 1 cm. lati basi squamis imbricatis in magnitudine variabilibus demum defectis dense obtecti vel basi reliquis squamarum instructi. Folia gemina terminalia ad apicem pseudobulbi sita lineari-oblanceolata 9 cm. longa 7 mm. lata deorsum gra-

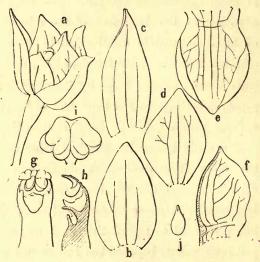


Fig. 29, Pholidota uraiensis HAYATA; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; f, the same in vertical section; g, a column; h, the same, in section; i, an operculum, lifted up; j, a pollinium.

datim attenuata ad petiolum 1½ mm. longum abeuntia ad apicem triangulariobtusa vel obtuse mucronata, lamina subcoriacea supra plana margine desuper

recurva ad costas subsulcata, nervis venisque utraque pagine non distinctis, petiolis haud distinctis cum pseudobulbo articulatis. Scapi vel racemi e basi pseudobulbi oriundi basi sqamiferi 8 cm. longi sursum filiformes, parte florifera 2\frac{1}{2}-3 cm. longa, bracteis ovatis 4½ mm. longis 4 mm. latis valde concavis subplicatis valde acutis 5-nerviis alabastrum floris amplectantibus caducissimis post anthesin deciduis, floribus subclausis vel subpatentibus 4 mm. longis densiusculis a se 2 mm. remotis, pedicellis ascendentibus 2 mm. longis, ovariis 1 mm. longis. Sepalum posticum ovatum 41 mm. longum 23 mm. latum apice angulato-obtusissimum basi vix contractum 2 mm. latum planum vel leviter concavum 3-nervium, nervis parallelis, margine integrum, lateralia obliqua ovata plicato-concava æquilonga cum postico, apice obtusa basi ± contracta 3-nervia dorso manifeste ad costam carinata, carinis infra apicem acute productis. Petala late oblonga vel late obovata 4 mm. longa 3 mm. lata apice triangulari-obtusa basi cuneato-obtusa ad basin 1 mm. lata subplana 3-nervia, nervis parallelis. Labellum valde concavum in explicato late rotundatum 3 mm. longum 41 mm. latum apice late rotundatum ad centrum breve obtuse cuspidatum, (cuspidibus triangularibus 1 mm. longis totiusque latis ad apicem obtusis), basi contractum prope basin disco transverso versus marginem valido, ad centrum tenui uno instructum basi ad pedem columnæ affixum. Columna 2 mm. longa subteres basi in pedem circ 1 mm. longum tumidum producta. Pollinia 4.

Hab. Uraisha, leg. S. Sasaki, Jan., 1913. Remarkable for its having scapes arising from the very base of the 1-noded pseudobulbs.

Calanthe R. Br.

Calanthe arisanensis HAYATA Mater. Fl. Formos. p. 327.

Hab. Inter Funkiko-Taroyen, leg. B. Hayata et T. Itō, Mart., 1914.

Note: Flowers nearly white, ovary slightly purple. Capsules elongatoobovoid $3\frac{1}{2}$ cm. long $1\frac{1}{2}$ cm. broad attenuate at the base, pedicels 1 cm. long.

Calanthe brevicolumna HAYATA (Fig. 30) Mater. Fl. Formos. p. 328. Caulis brevis incrassatus 1–2-foliatus. Folia sessilia oblanceolata 35 cm. longa 8 cm. lata apice acuta basi attenuata. Scapi aphylli vel 1-foliati vel vaginati 70 cm. longi validiusculi, racemis densifloratis 10 cm.·longis, bracteis ovatis

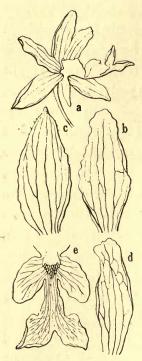


Fig. 30, Calanthe brevicolumna HAYATA; a, a flower; b, a uppermost sepal; c, a lateral sepal; d, a petal; e, a lip.

2 cm. longis 6 mm. latis. Flores mediocrini 2 cm. in diametro, pedicellis 5 mm. longis. Sepala æqualia erecto-patentia ovata 9 mm. longa 6 mm. lata apice obtusa basi contracta. Petala sepalis angustiora oblongo-angustata 1 cm. longa 3 mm. lata truncata basi angustata. Labellum sepalis longius, (unguis cum alis columnæ in tubum connatus, tubo late campanulato 3 mm. in diametro), ima basi in calcar 6 mm. longum 1½ mm. latum productum, calcari subrecto; lamina patens obovata in circumscriptione 8 mm. longa 5 mm. lata 3-lobata, lobo medio longiore 6 mm. longo apice divaricato-2-lobulato, (lobulis oblongo-truncatis), basi cuneato, lobis lateralibus minoribus oblique oblongis antice falcatis apice obtusis 3 mm. longis 1½ mm. latis; discus calloso-cristatus basi labelli 3-seriatim dispositus. Columna brevis 3 mm. longa. Clinandrium excavatum; rostellum 2-lobatum, lobis oblongis obtusis; anthera rotundata antice breve acuta. Pollinia 8 elongato-ovata apice acuminata, caudiculis brevissimis.

Hab. Taitō: Bataian, leg. T. KAWAKAMI, Aprili. 1907.

Near C. herbacea Lindl., but differs from it in having much shorter spurs, and in the lips, sepals, and in many other points.

Calanthe caudatilabella Hayata sp. nov. (Tab. XIII.) Pseudobulbi. Folia 5-6 ex apice pseudobulbi oriunda lineari-lanceolata 20-30 cm. longa 1-1½ cm. lata, apice acuminata basi gradatim attenuata basi plicata in exsiccato membranacea, venis lateralibus parallelis, venis transversis tessellatis. Scapi 35 cm. longi sursum racemosi, partibus floriferis 15 cm. longis, bracteis ovato-lanceolatis apice acuminatis, floribus a se 1 cm. remotis. Sepalum posticum lanceolatum 2 cm. longum 5 mm. latum apice acuminatum basi leviter contractum, lateralia oblique lanceolata 23 mm. longa 5 mm. lata apice acuminata basi leviter contracta. Petala parva linearia 12 mm. longa 2 mm. lata apice

acuminata. Labelli lamina ovata 16 mm. longa 12 mm. lata apice breve caudata basi contracta a medio sursum 3-lobata, lobo terminali ovato circ. 1 cm. longo 6 mm. lato apice cuspidato-caudato basi contracto 4 mm. lato, lobis lateralibus late oblongis apice truncatis 4 mm. latis 3 mm. longis, margine irregulariter crenulato-denticulatum basi cum columna connatum, partibus connatis 5 mm. longis intus villoso-pilosis, pilis rectis, calcaribus linearibus 5 mm. longis 1 mm. in diametro desuper recurvatis. Discus basi laminæ labelli situs 2-lamellatus. Columna brevis 4 mm. longa. Rostellum acutum apice 2-lobum, lobis acutis. Ovarium hirsutum 4 mm. longum, pedicello brevi.

Hab. Rinkiho: Gosarin, ad 7000 ped. alt., leg. H. Inaba, Aug., 1912. Calanthe forsythiiflora HAYATA sp. nov. (Tab. XIV.) Rhizoma erectum, radicibus incrassatis. Folia 4-3 fasciculata basi se involventia oblanceolata membranacea 40 cm. longa 6 cm. lata apice acuminata ad summum acuta basi gradatim attenuata, partibus attenuatis 13 cm. longis, nervis principalibus 5, inter nervos venis 12, venulis transversis tessellatis. Scapi e basi fasciculi foliorum oriundi 30-40 cm. longi aphylli vaginati, vaginis scariosis 3½ cm. longis 6 mm. in diametro apice acutis ore obliquissimis a se 8cm. remotis, partibus floriferis 8 cm. longis flores flavos racemosim gerentibus, floribus a se I cm. remotis horizontaliter patentibus vel sub nutantibus subsecundum dispositis, bracteis valde caducis non visis, pedicellis (cum ovario 7 mm. longis) 4 mm. longis. Sepalum posticum obovatum 8 mm. longum 4 mm. latum apice acutum vel aristato-acutum basi ∩ formiter insertum 3 mm. latum 3-5-nervium, lateralia oblique ovata vel obovata postico conformia. Petala tenuissima late ovata ± obliqua 7 mm. longa 4-5 mm. lata apice subito acuta vel mucronatoacuta basi contracta 1½ mm. lata 3-nervia, nervis parallelis, valde concava. Labellum basi cum columna connatum, lamina late rotundato-reniformi 3½ mm. longa 51 mm. lata apice late rotundata ad centrum emarginata ad medium partis emarginatæ breve mucronata basi contracta 2 mm. lata basi utraque latere auriculis instructa, auriculis semirotundatis 1 mm. longis totiusque latis, multinervium basi medio discis 2 instructum, discis auriculiformibus 1 mm. longis 1 mm. latis lamelliformibus, calcaribus ± recurvis 31 mm. longis apice ± dilatatis 1½ mm. in diametro. Columna 2 mm. longa; clinandrium concavum. Pollinia 8.

HAB. Köshun, leg. T. KAWAKAMI et T. ITŌ, 1909, Juni.

Very near C. Mannii Hook. fil. in Orch. Sikk. Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 225, in its external appearance, but differs by the quite yellow flowers with quite different lips.

Calanthe graciliflora HAYATA (Fig. 31) Mater. Fl. Formos. p. 329. Folia 2-3 oblongo-spathulata cum vaginis 30 cm. longa 6½ cm. lata apice

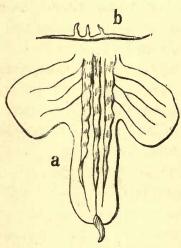


Fig. 31, Calanthe graciliflora HAYATA; a, a lip; b, section of a basal portion of the same.

acuminata basi gradatim attenuata ad vaginam abeuntia utrinque glabra plicatoplana. Scapi graciles 60 cm. longi, racemis laxifloratis, floribus mediocribus 3½ cm. in diametro, bracteis lanceolatis scariosis 1 cm. longis tenuibus, pedicellis gracilibus 1 cm. longis, petalis et sepalis valde postice reflexis, labello antice horizontaliter patenti. Sepala subæqualia oblongo-lanceolata 2 cm. longa 6 mm. lata apice aristato-acuminata basi leviter contracta 5-nervia extus breve hirtellata. Petala sepalis angustiora oblanceolata apice acuta basi attenuata 18 mm. longa 4 mm. lata 3-nervia. Labellum antice patens; unguis cum alis columnæ in tubum

connatus, tubo angusto (ore 2 mm. in diametro intus hirtellato) ima basi attenuato in calcar 12 mm. longum 1 mm. latum producto, calcari extus et intus hirtellato; lamina labelli rotundata in ambitu 1 cm. longa totiusque lata 3-lobata, lobo medio angusto 5 mm. longo 2 mm. lato apice emarginato-aristato, aristis 1 mm. longis desuper reflexis, lobis lateralibus quadrangulari-rotundatis 4 mm. longis totiusque latis oblique divaricatis; discus calloso-lamellatus, lamellis 3. Columna brevis 5 mm. longa clavata. Clinandrium excavatum, lobo posteriore truncato, anteriore (rostello) 2-lobato, lobis dentiformibus. Anthera opercularis incumbens, postice cordata antice acuminata 3 mm. longa distincte 2-locularis, loculis distincte 2-locellatis. Pollinia 8 subcomplanata elongato-ovata apice attenuata 1½ mm. longa caudiculis connata, caudiculis 1 mm. longis.

69

Hab. Nanō, Kimmonsha, ad 3200 ped. alt., Aprili. 1909, (No. 15), leg. U. Mori.

Near C. Henryi Rolfe., but differs from it by the much narrower leaves and by the lips with very much divaricate side-lobes which are inserted at nearly 90°. In the other species they are inserted at an acute angle and nearly as long as the middle lobe. Sepals and petals greenish red, rosaceous on the outer side, but greenish yellow on the inner; lips whitish; column light rose.

Calanthe Kawakamii Hayata (Fig. 32) Mater. Fl. Formos. p. 330. Caulis brevis in pseudobulbum late globosum 1 cm, longum incrassatus basi vagi-

natus supra basin foliatus. Folia oblonga 20 cm.longa 9cm. lata apice breve acuta basi abrupte ad vaginam contracta plicatoplana. Scapi 40-50 cm. longi graciles basifoliati vel aphylli vaginati, racemis laxe floratis, floribus breve pedicel latis, bracteis lanceolatis 1 cm. longis. Flores majusculi 3½ cm. longi, pedicellis 5 Sepala inæqualia extus brevissime mm. longis. hirtellata, posticum majus ovato-oblongum 33 mm. longum 15 mm. latum apice breve cuspidatoacutum basi contractum, lateralia angustiora oblongo-lanceolata 3 cm. longa 1 cm. lata apice obtuse acuminata basi angustata. Labelli unguis alis columnæ in tubum campanulatum (ore 5 mm. in diametro) connatus, ima basi in calcar 7 mm. longum rectum productus, lamina patens 2 cm. longa totiusque lata profunde

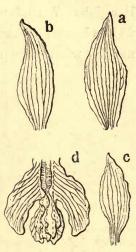


Fig. 82, Calanthe Kawakamii HAYATA; a, a dorsal sepel; b, a lateral sepel; c, a petal; d, a lip.

3-lobata, lobo medio obovato-oblongo 13 mm. longo 9 mm. lato apice emarginato ad sinus breve aristato basi angustato, lobis lateralibus divaricatis cultriformibus 1½ cm. longis 8 mm. latis apice rotundatis; discus 4-lamellatus, lamellis supra medium laminarum sitis, 2-lateralibus a medio deorsum intus dense pilosis. Columna lata brevis 8 mm. longa, alis cum ungue labelli connatis. Clinandrium profunde excavatum oblique truncatum, lobo anteriore (rostello) oblique erecto 2-lobato, lobis dentiformibus; anthera ad apicem membranarum posteriorum clinandrii affixa incumbens cordato-ovata apice obtuse

acuminata 7 mm. longa 4 mm. lata 2-locularis. Pollinia 8, in singulo loculo 4, cerea oblonga plus minus complanata apice attenuata basi rotundata circ. $2\frac{3}{3}$ mm. longa apice caudiculis connata, caudiculis filiformibus $2\frac{1}{2}$ mm. longis.

Hab. Shintiku: Gakokeizan, leg. T. KAWAKAMI et K. WATANABE, Aprili. 1907.

Calanthe lamellata Hayata sp. nov. (Fig. 33.) Caulis 20–30 cm. longus gracilis infra medium 2–3-foliatus sursum racemosus, racemis circ. 10 cm. longis. Folia 3–4 ovato-oblonga 15 cm. longa 6–7 cm. lata apice subito acuta basi attenuata sessilia caulem amplectantia margine integra vel leviter crispata, venis nervisque vena marginali connectis, bracteæ ovatæ vel ovato-lanceolatæ 7 mm. longæ. Sepala subæqualia; posticum ovato-oblongum 23 mm. longum 10 mm. latum apice acutum basi plus minus contractum margine non recurvum 5–nervium, lateralia postico conformia. Petala ovato-

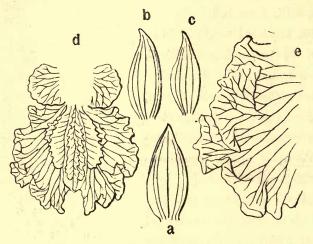


Fig. 33, Calanthe lamellata HAYATA; a, an uppermost sepal; b, a lateral sepal; c, a petal; d, labellum; e, margin of the same.

oblonga 1½ cm. longa 5 mm. lata apice acuta basi plus minus contracta 3-nervia vel obscure 5-nervia. Labellum ecalcaratum obovatum 2 cm. longum totiusque latum apice profunde emarginatum vel leviter 2-lobum ad centrum apicis brevissime triangulare acutum vel mucronato - acutum basi contractum plus

minus cordatum 3-lobum, lobis basilaribus (lateralibus) auriculiformibus 5 mm. longis totiusque latis vel quadrangularibus margine crenulatis, lobo terminali reniformi-rotundato $1\frac{1}{2}$ cm. longo 2 cm. lato basi contracto 2 mm. lato apice leviter bilobato ad centrum apicis brevissime acuto margine valde undulatoplicato-crispato. Discus ad medium lobi terminalis situs longitudinaliter 3-5 lamellatus, lamellis circ. 1 cm. longis 2 mm. latis, margine crispatis. Columna brevis.

HAB. Mt. Rontabun, leg. U. Mori, Aprili. 1910.

Remarkable for the broadly lamellate discs and for the leaves with a marginal vein connecting all other veins. Very near *C. tricarinata* LINDL., (Ann. Roy. Bot. Gard. Calc. IX. t. 103), but differs from it by the slightly longer terminal lobes of the lips which are much more strongly undulately folded at the margin and by the leaves which have veins running towards the margin, and a marginal vein connecting all other veins.

Calanthe reflexa MAXIM. (Fig. 34).

Hab. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. Hayata, Aprili. 1914.

Compared with a specimen of the species in the Tōkyō herbarium.

Note: Flowers slightly yellow.



Fig. 34, Calanthe reflexa Max., natural size.

Calanthe Sasakii Hayata sp. nov. (Fig. 35.) Caulis 30–50 cm. longus basi vaginatus, vaginis 5 cm. longis 1 cm. latis apice acutis scariosis nervosis. Folia sæpe gemina lanceolata 30–40 cm. longa 5 cm. lata apice acuta basi gradatim attenuata ad petiolum 10 cm. longum abeuntia in exsiccato membranacea. Partes caulis floriferæ 10 cm. longæ laxiuscule floratæ, floribus a

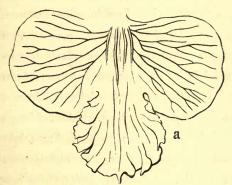


Fig. 33, Calanthe Sasakii HAYATA; a, a lip.

se 2 cm. remotis, pedicellis (cum ovariis) $2\frac{1}{2}$ cm. longis gracillimis, bracteis ovato-lanceolatis 1 cm. longis. Flores 3 cm. in diametro. Sepala: posticum oblongo-lanceolatum 22mm. longum 7 mm. latum apice acuminatum basi angustius $2\frac{1}{2}$ mm. latum 5-nervium margine \pm undulatum integrum; lateralia æquilonga obliqua apice acuminata. Petala lanceolata

sepalo breviora 18 mm. longa $4\frac{1}{2}$ mm. lata apice acuminata basi 2 mm. lata 3-nervia. Labelli lamina sessilis basi calcarata flabelliformis basi \pm cordata 1 cm. longa $1\frac{1}{2}$ cm. lata 3-lobata, lobo centrali 15 mm. longo 6 mm. lato apice emarginato ad centrum aristato margine valde plicato-crispato, lobis lateralibus lobo terminali latioribus margine subintegris \pm crispatis; calcari ab

apice usque ad laminam labelli 2 cm, longo apice subrecto acuto. Discus basi laminæ 3-striatim dispositus obscurus. Columna 5 mm, longa ± dorso recurva.

Hab. Akō, Mt. Buyesan, leg. S. Sasaki, Mart., 1910.

Eulophia R. Br.

Eulophia brachycentra Hayata sp. nov. (Fig. 36, a) Fasciculi foliorum basi vaginati, vaginis 3-4, 10-20 cm. longis inferiore cylindraceis superiore lanceolatis. Folia 3-4-fasciculata lineari-lanceolata circ. 50 cm. longa 12 mm. lata apice acuminata basi 'gradatim attenuata inferiore prope basin vaginata se amplectantia supra minute elevato-venulosa subtus prominente 3-nervia, nervis elevatis, minute venulosa. Scapi (racemi) 75 cm. longi folia multo

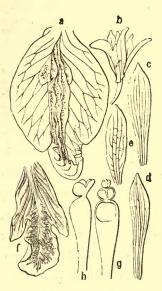


Fig. 36, a, Eulophia brachycentra HAYATA; b-h, Eulophia ramosa HAYATA; b, a flower; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip; g, a column, seen from front; h, the same, seen from side; b, natural size, others more or less magnified.

superantes, parte non florifera 62 cm. longa ad nodos vaginata, vaginis cylindraceis 10 cm. longis sursum lanceolatis acuminatis, parte florifera 10-13 cm. longa densiuscule florata, floribus a se 1 cm. remotis, bracteis glabris lanceolatis 1 cm. longis apice acuminatis, pedicellis cum ovariis 15-20 mm. longis, floribus apertientibus 25 mm. in diametro, sepalis petalisque patentissimis. Sepalum posticum obovato-oblongum 13 mm. longum 6 mm. latum apice obtusum ad summum apiculatum, (apiculo desuper recurvo), basi ± contractum 2 mm. latum 7-9-nervium margine planum prope apicem interiore recurvum glabrum, lateralia cum postico conformia ± obliqua. Petala oblonga sepalo postico latiora 13 mm. longa 7-8 mm. lata apice obtusissima basi contracta obtusissima 2 mm. lata 7-nervia. Labellum erecto-patens late obovatum 13 cm. longum 14 mm. latum glabrum basi subcalcaratum vel menti-forme (mento 4 mm. longo) 3-lobatum, lobis lateralibus (basilaribus) semi-oblongis apice rotundatis 3-4 mm. latis

suberectis margine integris, lobo terminali oblongo 7–8 mm. longo 7 mm. lato apice perfecte rotundato basi non contracto margine sursum undulato plicato. Discus

a prope apicem ad supra basin situs 5-striato-lamellatus, lamellis sursum convergentibus crassiusculis crispatis medio tenuissimis vel ad nullum reductis evanescentibus deorsum prominentibus latioribus, partibus latioribus circ. 1 mm. latis. Columna 8 mm. longa semiteres —-formis in sectione subapoda? Pollinia 2 globosa, stipite lineari 1½ mm. longo ½ mm. lato.

Hab. Taitō: Shinkōgai, leg. Z. Kobayashi, Juni., 1906, fl.

Near Eulophia herbacea Lindl. (Ann. Roy. Bot. Gard. Calc. XI. part-2, t. 106.), but differs from it by the narrower leaves, lamellate discs, undulate margins of the lips and by many other points.

Eulophia ramosa Hayata (Fig. 35, b-h), Mater. Fl. Formos. p. 332. Caulis circ. 50 cm. longus glaber angulatus striatus basi squamatus, (squamis amplexicaulibus ovatis acutis 15 mm. longis), superiore racemosus. (KAWAKAMI, No. 6281) inferiora lanceolato-linearia 20 cm. longa 6 mm. lata basi amplexicaulia ad vaginam attenuata, superiora minora linearia 3-6 cm. longa amplexicaulia plicata. Racemi 20-25 cm. longi pauci-ramosi, ramis Flores erecto-ascendentes 15 mm. longi, pedicellis cum gracilibus erectis. ovario 15 mm. longis, bracteis ovatis acuminatis pedicellum amplectantibus 7 mm. longis. Sepala æquiformia lanceolato-angustata 12 mm. longa 2½ mm. lata apice acuta basi leviter angustata erecta. Petala sepalis latiora plus minus breviora 11 mm. longa 3½ mm. lata lanceolato-oboyata apice acuta erecta. Labellum a basi columnæ erectum obovatum sepalum in longitudine æquans 11 mm. longum 8 mm. latum, inter sepala lateralia in calcar gibbosum 2 mm. longum ad apicem leviter contractum productum, supra basin contractum 3-lobatum, lobis lateralibus erectis columnam amplectantibus latissimis margine latere integris antice eroso-denticulatis apice obtusis, lobo centrali patenti globoso-obovato 4 mm. longo 5 mm. lato apice rotundato-truncato basi leviter contracto ad basin 3 mm. lato. Discus medio a basi labellorum usque ad medium 3-lamellatus, (lamellis utrinque ramosis), etiamque ad paginam lobi centralis a medio usque ad prope apicem fimbriato-cristatus. Columna brevis crassa apoda sæpius 2-alata. Ovarium cylindricum sulcatum 6 mm. longum.

Hab. Nöközan, leg. T. Kawakami et U. Mori, 1908, Jan. (No. 6281). The present species is near *E. taiwanensis* Hayata, from which it differs in having branched inflorescence and smaller flowers with slightly denticulate lips.

Cymbidium Sw.

Cymbidium albo-jucundissimum HAYATA sp. nov. Pseudobulbi annotini conico-ovati 6 cm. longi 2½ cm. lati infra medium latissimi subcomplanati circ. 4-nodosi, internodiis longioribus 1½ cm. longis, brevioribus 8 mm. longis. Folia lanceolata 30 cm. longa 22 mm. lata apice acuminata basi cum petiolis articulata supra nitida viridia subtus opaca margine sub lente suberosa, costis subtus acuto-elevatis, nervis lateralibus principalibus utroque latere costæ 2, crasso-coriacea, petiolis 2 cm. longis subplicatis in explicato 12 mm. latis. Scapi vel racemi 30 cm. longi. Flores apertientes 4 cm. in diametro, pedicellis cum ovariis 12 mm. longis, albescentes. Sepalum posticum obovatolineari-lanceolatum 23 mm. longum 4 mm. latum apice acuminatum basi vix contractum 2 mm. latum 5-nervium planum margine integrum planum, lateralia cum postico conformia. Petala ovato-lanceolata 2 cm. longa 5 mm. lata apice acuta basi obtusa 5-nervia margine interiore recurva basi 1 mm. lata. Labellum ovatum 1½ cm. longum 11 mm. latum, hypochilo 8 mm. longo 11 mm. lato rotundato erecto basi rotundato-contracto 23 mm. lato facie glabro medio disco 2-lamellato instructo, lamellis subadnatis ()-formiter dispositis, latere erecto, epichilo desuper recurvo oblongo facie dense brevissime muricatohirtello 8 mm. longo 7 mm. lato apice obtusissimo ad summum brevissime triangulare apiculato vel non apiculato sursum prope apicem margine interiore subrecurvo. Columna 12 mm. longa 3-31 mm. lata complanato-semiteres subalata.

Hab. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. Hayata, 1914, Mart.

Near C. sinense Willd, but differs from it by the smaller nearly white flowers, in the maculation of the lips and in more hirsute terminal lobe of the latter.

Cymbidium aloifolium Swartz (Fig. 37, et 38-a); Orch. Sikkim Himal. in Ann. Roy. Bot. Gard. Calc. VIII. t. 252.

Hab. Formosa: loco non indicato, cult. in seminario Taihoku, leg. T. Sōma, Aug. 1913, (fl.).

Columnal foot is more conspicuous in our plant than in the figure in the above mentioned work. The following description is drawn from our specimens.

Observ. Folia crassa linearia 30-60 cm, longa 1½ cm, lata in vivo supra

nitida viridissima, venis non visis, ad costam tenuiter sulcata subtus pallidiora, costis elevatis, margine desuper recurva apice inæqualiter emarginata vel inæqualiter 2-loba, (lobo longiore 2 mm. longo 7 mm. lato apice

rotundato, lobo breviore subnullo), basi non angustata plicata cum vaginis articu-Scapi vel racemi lata. penduli 32 cm. longi, partibus basilaribus non floriferis 8 cm. longis, partibus floriferis 24 cm. longis, floribus a se 4 cm. remotis, bracteis lanceolatis 2 cm. longis pedicellum vix superantibus, pedicellis cum ovariis 2 cm. longis patentibus gracilibus glabris. Flores 3-4cm. in diametro, sepalis valde reflexoretrorsis, labello suberecto. Sepalum posticum linearilanceolatum 2 cm. longum apice acutum basi vix vel haud angustius 21 mm. latum supra medium latissimum 4½ mm. latum nervium margine valde reflexum convexum, lateralia cum postico æquilonga vix latiora 5 mm. longa ± obliqua 6-nervia margine valde tographed by Mr. T. Sōma. reflexa. Petala oblanceolata



Fig. 87, Cymbidium aloifolium Swartz, x1; photographed by Mr. T. Sōma.

 $2~{\rm cm.}$ longa $6~{\rm mm.}$ lata apice acuta basi gradatim angustata basi $2~{\rm mm.}$ lata margine valde exteriore recurva erecta 6-nervia \pm obliqua. Labellum

crassiusculum ad marginem tenue late oblongum 16 mm. longum 12 mm. latum apice truncatum ad centrum breve triangulare apiculatum, apiculis ½ mm. latis ¼ mm. longis, vel retusum basi contractum facie supra brevissime villosum subtus glabrum, hypochilo erecto basi ± saccato medio discis 4 tuberculato-elevatis �-formiter dispositis, epichilo desuper recurvo patenti, lobis lateralibus (hypochili) lineari-oblongis 4½ mm. longis apice acutis, lobo-

terminali (epi-

chilo) oblongo

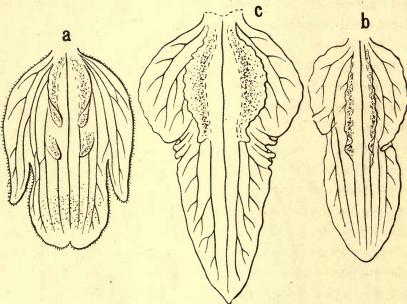
8 mm. longo 7 mm. lato apice truncato apiculato vel retuso basi haud contracto 8-nervio. Columna 13 mm. longa semiteres sensim alata sub-

recurva

ad

basi

pedem



brevissimum

Fig. 38, a, Cymbidium aloifolium Swartz.; b, Cymbidium misericors

HAYATA; c, Cymbidium oreophilum HAYATA; a, b and c, ×3.

producta.

Cymbidium arrogans Hayata sp. nov. Folia lineari-lanceolata 30–40 cm. longa 13 mm. lata apice acuminata basi attenuata supra minute venulosa subtus prominente 3-nervia inter nervos minute venulosa. Scapi (racemi) 30 cm. longi erecti, parte non florifera 18 cm. longa vaginata, parte florifera 10–12 cm. longa, bracteis ovato-lanceolatis 1 cm. longis 2 mm. latis apice acutis, pedicellis cum ovario 1½ cm. longis. Flores apertientes 3½ cm. in diametro. Sepalum posticum oblongum 38 mm. longum 8 mm. latum apice obtuso-acutum basi ± contractum 5-nervium margine integrum planum, lateralia oblonga 2½ cm. longa 8 mm. lata apice obtusa basi haud contracta desuper leviter —formiter falcata. Petala oblonga sepalo breviora 2 cm. longa 8 mm. lata

apice acuto-obtusa basi cuneato-contracta 5-nervia. Labellum ovato-oblongum 18 mm. longum 1 cm. latum facie brevissime hirsutum inter hypochilum et epichilum constrictum ad constrictionem 7 mm. latum, hypochilo subrotundato 1 cm. in diametro basi cuneato-contracto 9-nervio erecto medio discis 2-lamellatis instructo, lamellis ()-formiter dispositis apice acutis, epichilo late ovato-rotundato 8-9 mm. lato 8 mm. longo apice rotundato-obtuso ad summum breve apiculato facie brevissime hirtellato 5-nervio patenti desuper recurvo. Columna complanata semi-teres 12 mm. longa.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, Juni. 1912.

Near C. ensifolium Sw. (Bot. Mag. t. 1751; Sōmokudusetsu, Vol. VIII. tt. 1 et 2); but differs by the falcate semi-oblong lateral sepals.

Cymbidium formosanum HAYATA Mater. Fl. Formos. p. 335. Folia ad apicem pseudobulbi 4-5 fasciculata, fasciculo singulo basi vaginis 4 apice ovato-lanceolatis acuminatis subplicatis nervosis 6-14 cm. longis involuerato, lamina linearia lanceolata 40 cm. longa 6-7 mm. lata apice acuminata basi gradatim attenuata in exsiccato coriaceo-membranacea, nervis principalibus 3 supra prominente elevatis, inter nervos multivenata. Scapi 1-florati 6-10 cm. longi basi multi-vaginati, vaginis prope medium scapi 7 cm. longis a basi usque ad medium cylindraceis a medio usque ad apicem lanceolatis apice acuminatis scapem basi complete sursum fere amplectantibus glabris, vaginis superrimis cum flore subæquilongis. Flores solitarii apertientes 6 cm. in diametro, petalis sepalisque patentissimis, suberecti vel subnutantes, pedicellis cum ovariis 2-3 cm. longis gracilibus. Flores ut videntur in exsiccato fusco-atro-purpurascentes. Sepalum posticum oblanceolatum 38 mm. longum 9 mm. latum apice acuto-acuminatum basi angustato-cuneatum basi 3 mm. latum 5-nervium planum, lateralia cum postico æquiformia ± longiora 4cm. longa 1 cm. lata apice acuminata basi angustata basi 5 mm. lata margine leviter exteriore recurva 7-nervia. Petala oblonga oblongo-elliptica 21 cm. longa circ. 1 cm. lata apice obtusissima vel obtusa basi 5 mm. lata 5-nervia plana. Labellum ampulliforme inferiore late rotundatum superiore oblongum, partibus late rotundatis (hypochilis) crassiusculis 12 mm. latis 9 mm. longis V-formiter versus longitudinem subplicatis medio discis 2-lamellatis instructis, lamellis ()-formiter dispositis recurvis crassiusculis 1 mm. latis, partibus

superioribus (epichilis) oblongis 9 mm. longis apice rotundatis desuper reflexis liguliformibus margine subintegris. Columna elongata 1½ cm. longa 4 mm. lata antice subalata, alis ½ mm. latis. Capsula clavato-cylindrica 6–7 cm. longa 22 mm. lata 6–costata, costis 3 mm. latis, partibus inter costas 7 mm. latis, apice obtusissima basi attenuata rostrata ad stipitem gradatim abeuns, pedunculis 22 cm. longis.

HAB. Montibus centralibus, leg. U. Mori, Nov. 1906, (fl. et fr).

Near C. virens Lindl., but differs from it by the much longer and acuter sepals. Also near Cymbidium Mackinnoni Duthie, Ann. Roy. Bot. Gard. Calc. IX. t. 115, but quite distinguishable from it by the obovoid cylindrical and nearly clavate capsules, and by the much narrower sepals.

Cymbidium illiberale Hayata sp. nov. Folia lineari-lanceolata 40 cm. longa 1 cm. lata apice acuminata basi attenuata utraque minute venulosa subtus distincte supra haud nervata valde coriacea. Scapi vel racemi 20 cm. longi erecti basi vaginato-squamati, parte non florifera 10 cm. longa, parte florifera 10 cm. longa, bracteis lanceolatis minutis 5 mm. longis acutis, pedicellis cum ovariis 18 mm. longis, floribus a se 1-3 cm. remotis. Sepalum posticum lineari-lanceolatum 18 mm. longum 31 mm. latum apice triangulari-obtusum basi haud contractum 2 mm. latum planum manifeste 3-nervium vel obscure 5-nervium, lateralia quam postico breviora et latiora 1½ cm. longa 4½ mm. lata apice obtusa basi haud contracta 3 mm. lata lineari-oblonga plana distincte 7-nervia haud obliqua. Petala oblique lineari-oblonga 12 cm. longa 44 mm. lata apice obtusa basi angustiora 1½ mm. lata plana 7-nervia leviter ~-formiter recurva. Labellum late obovatum facie brevissime hirsutum 13 mm. longum 11 mm. latum apice rotundatum vel ad summum breve triangulari-cuneatum, hypochilo erecto medio discis 2-costatis instructo, costis 8 mm. longis paralleliter dispositis, lobis lateralibus (hypochili) semi-oblongis apice rotundatis a basi labelli usque ad apicem 1 cm. longis 5 mm. latis erectis, lobo terminali (epichilo) desuper recurvo rotundato 6 mm. in diametro. Columna 13 mm. longa complanato-semiteres recurva intus brevissime hirsuta sursum alata, alis 1 mm. latis. Petala sepalaque viridescentia ± rubescentia. Labelli disci flavescentes; labelli lobi laterales rubro-punctati, lobo terminali ORCHIDEE. 79

rubro-maculato. Labellum subtus leviter rubescens basi atro-rubrum. Columna basi atro-sanguinea.

Hab. Formosa: loco non indicato: cult. in Taihoku seminario, Mart., 1914, leg. B. Hayata, (fl.).

Near Cymbidium pumilum Rolfe (in Kew Bullet. 1907, p. 130; Kinryō-hen, Sōmokuzusetsu, XVIII. t. 13.); but differs from it by the light reddish green petals and sepals and by the lips which are light red with a red maculation on the front lobe, and numerous minute red spots on the side lobes.

Cymbidium lancifolium Hook. f.; Orchid. Sikkim Himal. in Ann. Roy. Bot. Gard. Cale. VIII. t. 247.

Hab. Formosa: loco non indicato; cult. in bot. horto. Tōkyō, leg. B. Hayata.

The orchid has been cultivated in our garden since some years, and is believed to have come from Formosa. The flowers are slightly different from the figure given in the above referred work.

Cymbidium misericors Hayata sp. nov. (Fig. 38-b). Pseudobulbi vix prominentes. Fasciculus folii 4-5-foliatus. Folia lanceolata 30-40 cm. longa 11 mm. lata apice acuta vel obtusa basi attenuata basi in parte angustissima 5 mm. lata infra basin dilatata 1½ cm. lata pseudobulbos semi-amplectantia margine integra prope apicem sub lente denticulata in vivo tenuiter coriacea, nervis principalibus 3, inter nervos multivenulata, nervis venisque supra minus subtus plus prominentibus. Racemi (scapi) 15-20 cm. longi laxe florati, floribis a se 3-4 cm. remotis, bracteis lanceolatis circ. 1 cm. longis acuminatis, pedicellis cum ovariis 2½-3 cm. longis. Flores apertientes 4 cm. in diametro viridialbescentes haud maculati fragrantes, inter menses Septembris et Octobris apertientes. Sepalum posticum oblongo-oblanceolatum 27 mm. longum 9 mm. latum supra medium latissimum apice acutum vel obtusum ad summum apiculatum basi ± angustius ad insertionem haud contractum 3 mm. longum subplanum vel margine tenuissime exteriore recurvum distincte 5-nervium crassiusculum margine integrum, lateralia cum postico æquilonga sed angustiora oblanceolata 6 mm. lata apice obtusa ad summum apiculata basi cuneatoangustata ad basin 3 mm. lata 5-nervia. Petala oblonga 24 mm. longa 1 cm. lata vel obovato-oblonga apice obtusa sed ad summum acuta basi obtusoSO ORCHIDEÆ.

contracta 2 mm. lata plana distincte 7-nervia. Labellum obovato-oblongum 21 mm. longum 12 mm. latum apice late obtusum basi rotundato-contractum, hypochilo 8 mm. longo 9 mm. lato valde concavo medio discis 2-lamellatis crassis instructo, epichilo rotundato 12 mm. longo desuper reflexo convexo 7-nervio, crassiusculum facie minute sub lente tuberculatum margine sub lente minute denticulatum. Columna 12 mm. longa leviter recurva semiteres \sim -formis in sectione apoda.

HAB. Mt. Kwannonzan, prope Tamsui; cult. in seminario Taihoku, leg. B. HAYATA et T. SōMA, Mart. 1914.

Near C. kanran MK. (in Sōmokudsusetsu XVIII. t. 6), but differs from it by the greenish flowers with non-dotted lips.

Cymbidium oreophilum HAYATA n. sp. (Fig. 38-c). Folia et habitus ut speciei præcedentis (Cymbidii misericordis). Racemi (scapi) circ. 50 cm. longi, partibus non floriferis 30 cm. longis basi squamatis, squamis subvaginiformibus 4-5 cm. longis inferiore cylindraceis superiore lanceolatis apice acuminatis nervosis, floribus a se 5 cm. remotis, bracteis lanceolatis 2 cm. longis acuminatis, pedicellis cum ovariis 31 cm. longis. Flores apertientes fragrantes 7 cm. in diametro viridescentes, sepalis petalisque retrorse reflexis; labellum flavescens rubro-maculatum. Sepalum posticum lineari-lanceolatum 4½ cm. longum 4 mm. latum apice acuminatissimum basi haud contractum sed leviter angustius 5-nervium margine exteriore recurvum valde retrorse reflexum, lateralia cum postico conformia sed \pm obliqua. Petala ovato-lanceolata $3\,\mathrm{cm}$. longa 7-8 mm. lata apice acuminata basi contracta ad insertionem 2 mm. lata 5-nervia margine integra subplana. Labellum oblongo-ovatum 25 mm. longum 15 mm. latum apice obtusum apice triangulari-acutum tenuiter interiore recurvum basi rotundatum contractum ad insertionem 3 mm. latum, hypochilo late rotundato 14 mm. lato 12 mm. longo medio discis 2-lamellatis instructo, (lamellis ()-formiter dispositis crassis 1 mm. latis recurvis sublævibus), concavo crassiusculo margine tenuissimo erecto, epichilo elongatotriangulari ovato 1½ cm. longo 1 cm. lato crassiusculo margine tenuissimo undulato-integro valde desuper recurvo. Labellum subtus læve supra toto minute tuberculatum margine sub lente minute denticulatum. Columna semiteres 13 mm. longa A-formis in sectione subalata.

Cymbidium misericors Hayata var. oreophilum Hayata in sched. herb. Taihoku.

Hab. Formosa: loco non indicato; cult. in seminario Taihoku, leg. B. HAYATA, Mart. 1914.

The present orchid was regarded as a variety of the preceding species. After careful examination, I have found that the sepals and petals of this new plant are considerably larger than those of the preceding species, and the lips of the former are minutely botryoideo-tuberculate all over the upper surface, while those of the latter are hirsute. All these collectively make it sufficient to regard this new plant as specifically different from the preceding species.

Cymbidium purpureo-hiemale HAYATA sp. nov. Folia angustissime linearia 40 cm. longa 5-6 mm. lata apice acuminata basi angustissime attenuatoplicata supra minute venulosa subtus 3-nervia, nervis prominentibus, inter nervos minute venulosa tenuiter coriacea. Scapi vel racemi 25-30 cm. longi, parte florifera 15 cm. longa laxe florata, floribus 3-4 cm. a se remotis, bracteis subnullis (vel caducissimis?) 1 mm. latis annuliformibus $\frac{1}{10}$ mm. longis, pedicellis cum ovariis 12 cm. longis. Flores apertientes 62 cm. in diametro. Sepalum posticum lineari-lanceolatum 4 cm. longum 4 mm. latum apice acuminatum basi haud contractum 5-nervium margine interiore recurvum, lateralia quam postico vix breviora vix latiora 3½ cm. longa 4 mm. lata sursum margine interiore recurva. Petala ovato-lanceolata 2½ cm. longa 6 mm. lata apice acuta basi contracta 1½ mm. lata ± concava margine plana 7-nervia. Labellum brevissime hirtellum in circumscriptione ovatum 22 mm. longum 12 mm. latum, hypochilo erecto late rotundato 12 mm. lato 9 mm. longo margine integro (lobis lateralibus erectis) medio discis 2-lamellatis instructo, lamellis circ. ½-1 mm. latis ()-formiter dispositis, epichilo desuper recurvo oblongo 12-13 mm. longo 7 mm. lato apice triangulari-obtusissimo ad apicem vel prope apicem margine interiore recurvo margine subintegro basi non contracto basi secus nervos manifeste hirtello, inter hypochilum et epichilum constrictum 6 mm. latum. Columna 12 mm. longa tenuiter recurva complanato-semi-teres sursum subalata.

Hab. Formosa: loco non indicato: cult. in seminario Taihoku, leg. B. Hayata, 1914, Mart.

Near Cymbidium kanran Mak. in Somokuzusetsu Vol. XVIII. tt. 4, 5

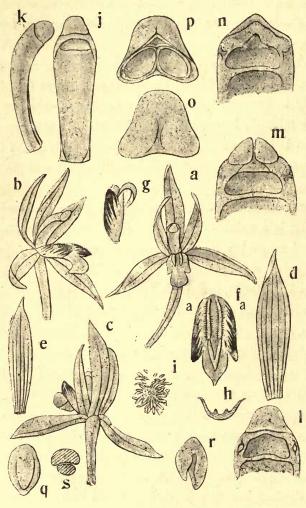


Fig. 39, Cymbidium Simonsianum K. et P.; a, b, c, a flower, seen from different sides; d, a sepal; e, a petal; f, a lip; g, the same, seen from side; h, the same, in section of a portion shown by a-a in fig. f; i, a portion of the disc; j, a column; k, the same, seen from side; l, apical portion of the same; m, the same, operculum taken off; n, the same, pollinarium taken off; o, an operculum, seen from front; p, the same, seen from back; q, a pollinium; r, the same, seen from side; s, the same in section; fig. a-c, natural size; others more or less magnified.

et 6, but differs from it by the lips with hirsute lines on the terminal lobes.

Cymbidium simonsianum KingetPantling (Fig. 39). Orch. Sikk. Himal. in Ann. Roy. Bot. Gard. VIII. t. 250. HAB. Mt. Arisan. Observ. Folia 40-50 cm. longa linearia 9 mm. lata apice acuminata basi attenuata in exsiccato valde coriacea utraque pagine haud distincte nervata sed minute elevato-venulosa basi cum petiolis articulata, petiolis 6 cm. longis late sulcatis semicircularibus in sectione in explicato 6 mm. longis basi dilatatis, partibus dilatatis 1 cm. longis totiovatis usque latis semiamplexicaulibus. Scapi vel racemi 45 cm. longi basi vaginatosquamati, squamis 6-7 em. longis acuminatis lanceolatis, bracteis triangulari-lanceolatis 5 mm. longis, floribus apertientibus 4½ cm. in diametro. Sepalum posticum oblanceolatum $2\frac{1}{2}$ cm. longum $6\frac{1}{2}$ mm. latum apice acuminatum basi non contractum 4 mm. latum prope apicem margine interiore recurvum 7-nervium, lateralia cum postico conformia plus minus obliqua. Petala oblongolanceolata 2 cm. longa $5\frac{1}{2}$ mm. lata apice acuto-acuminata basi vix contracta $1\frac{1}{2}$ mm. lata 7-nervia margine integra plana. Labellum in circumscriptione ovatum 16 mm. longum 11 mm. latum apice cuspidato-acuminatum basi cuneatorotundatum ad basin contractum $1\frac{1}{2}$ mm. latum facie glabrum basi in hypochilo erecto medio discis 2-carinatis instructum, carinis 6 mm. longis $\frac{1}{2}$ mm. latis elevatis hirtellis paralleliter | |-formiter dispositis, 3-lobum, lobis lateralibus (hypochili) oblongis $2\frac{1}{2}$ mm. latis a basi lobi terminalis ad apicem lobi lateralis $3\frac{1}{2}$ mm. longis apice obtusis, sinibus inter lobos laterales et lobum terminalem obtusis, lobo terminali (epichilo) desuper recurvo ovato 9 mm.longo 6 mm. lato apice cuspidato-acuminato basi rotundato-contracto ad basin 5 mm. lato. Columna 1 cm. longa complanato-semiteres 4 mm. lata glaberrima subalata, alis sursum $\frac{1}{2}$ mm. latis.

Cymbidium sinense WILLD.; Sōmokudsusetsu XVIII. t. 11. Hab. Heichōshō, leg. S. Nagasawa, fl. 1904, (No. 340).

Observ. Folia lanceolata 50 cm. longa 21 cm. lata apice acuminata basi attenuata supra utroque latere costæ prominente 2-nervata inter nervos minute venulosa, costa supra non distincta non elevata, subtus cum costa prominente 3-nervata, inter nervos minute venulosa. Scapi vel racemi 60-70 cm. longi, parte non florifera 40 cm. longa vaginato-squamata, squamis cylindrico-lanceolatis acuminatis 7-8 cm. longis, parte florifera 20 cm. longa laxe florata, floribus a se 3-4 cm. remotis, bracteis lanceolatis acuminatis 12 mm. longis glabris, pedicellis cum ovariis 2 cm. longis. Flores apertientes 5-6 cm. in diametro. Sepalum posticum lineari-lanceolatum 3½ cm. longum ½ cm. latum, acuminatum basi vix contractum 2 mm. latum margine ± exteriore recurvum 7-nervium, latelaria cum postico conformia. Petala ovato-lanceolata 26 mm. longa 8 mm. lata apice obtusa ad summum acuta basi obtuso-contracta 2 mm. lata 7-nervia plana. Labellum tenuissime hirtellum in circumscriptione ovatum 17 mm. longum 10 mm. latum obtusissimum basi rotundato-cuneato-contractum 1½ mm. latum, hypochilo late rotundato 9 mm. longo 1 cm. lato medio discis 2-lamellatis instructo, (lamellis sursum latiusculis versus apicem se convergentibus

()-formiter dispositis), erecto margine latere erecto, epichilo oblongo 11 mm. longo 7 mm. lato apice obtuso basi vix vel haud contracto secus nervos subtuberculato transverse maculato. Columna 13 mm. longa \pm recurva complanato-semiteres alata.

Cremastra Lindl.

Cremastra triloba Hayata (Fig. 40) Ic. Pl. Formos. II. p. 135. Herba terrestris, rhizomate erecto tuberoso ovoideo-globoso 1½ cm. longo basi totiusque

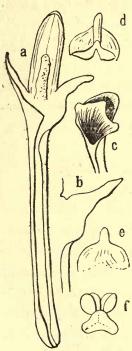


Fig. 4O, Cremastra triloba HAYATA; a, a lip; b, lateral lobe of the same; c, apical portion of the columna; d, an anther, seen from back; e, the same, seen from front; f, pollinarium.

lato apice acuto basi latissimo 2-3 nodoso ad nodos vaginato, (vaginis defectis), ad apicem folium unum gerenti, ad nodos juxta apicem scapum unum gerenti. Folia solitaria longe petiolata basi petioli 1 (vel 2?) vaginis instructa, (vaginis petiolum in longitudine superantibus apice plus minus dilatatis obtusis), petiolis 10-12 cm. longis dimidium laminæ in longitudine æquantibus subteretibus tubulosis, laminis cum petiolum articulatis elliptico-lanceolatis 30 cm. longis. 5 cm. latis apice acutis basi attenuatis linearibus, (partibus linearibus 6-7 cm. longis 3 mm. latis plicatis, petiolis articulato-continuiis) membranaceis, venis elevatis subplicatis. Scapi solitarii 30-40 cm. alta teretes 5 mm. in sectionis diametro basi 2nodosi, internodiis inferioribus 4 cm. longis, superioribus 10 cm. longis ad nodos vaginatis, (vaginis tubulosis 5-6 cm. longis apice acutis vel obtusis,) partibus florigeris 10-15 cm. longis racemosis. Flores ascendento-patentes vel erecto-patentes plus minus secundi 3 cm. longi, segmentis conniventibus apice vix patentibus, pedicellis (cum ovariis) 13 mm. longis, bracteis lanceolatis 8 mm. longis. Sepala subæqualia conniventia lineari-oblanceolata apice acuta basi attenuata,

posticum 33 mm. longum 4 mm. latum basi non contractum, lateralia plus minus obliqua. Petala angustiora lineari-oblanceolata breviora quam sepalis 30 mm. longa 3 mm. lata apice acuta basi attenuata. Labellum lineare

sepalum posticum in longitudine æquans 33 mm. longum versus apicem 3-lobatum, (lobo medio oblongo 8 mm. longo 3½ mm. lato apice obtuso vel rotundato basi non contracto, lobis lateralibus angulo 45° divaricatis lanceo-lato-triangularibus basi latere inferiore auriculatis plicatis 4 mm. longis apice obtusis vel acutis), basi lobi medii 1-appendiculatum, appendiculis liguliformibus liberis crassiusculis minute tuberculatis, margine a lobis lateralibus usque ad basin labelli plicato-inflexum basi leviter ventricosum. Columna linearis 23 mm. longa labello brevior exalata apice dilatata, partibus dilatatis obtriangularibus 3-4 mm. latis; rostellum latissimum. Pollinia 4.

Hab. Mt. Nashitanzan, Mt. Rontabunzan, Jiōgesha, leg. U. Mori, Aprili., 1910.

Near a small form of *C. Wallichii*, but differs distinctly by the labellum, the lobes of which are much more divaricate. In the Indian species, the side lobes of the lips are nearly parallel to the middle lobe.

Luisia GAUD.

Luisia megasepala HAYATA sp. nov. (Fig. 41). Epiphyta. teres viridis 20-30 cm. longus ramosus cum vaginis foliorum 4 mm. in diametro tota longitudine foliosus vaginis foliorum toto obtectus. Folia alterna a se 2 cm. remota; vagina foliorum cylindrica 2 cm. longa 4 mm. in diametro ore subtruncata vel leviter obliqua, lamina foliorum ± lateraliter compressa tereto-lineari circ. 10 cm. longa 2 mm. in diametro apice obtusa basi oblique cum vaginis articulata. Racemi 2-3-florati latere caulis per vaginam oriundi brevissimi, rhachibus 1 cm. longis bracteis pluri-seriatis perfecte obtectis, bracteis distiche imbricateque dispositis latissime triangularibus, superioribus majoribus 3 mm. longis 6 mm. latis, pedicellis 1 cm. longis, floribus subcernuis. Sepala leviter viridia dorso purpureo-punctata, petalis flavo-viridibus, labello supra atro-purpureo subtus medio viridi, partibus lateralibus labelli purpureis. Sepalum posticum oblongum 13 mm. longum 7-8 mm. latum 6-nervium apice rotundatum basi 6 mm. latum; sepala lateralia oblonga 13 mm. longa 7-8 mm. lata apice dorso carinata leviter cornuata 5-nervia. Petala obovato-oblonga sepalo longiora 16 mm. longa 7 mm. lata apice obtuso-rotundata deorsum ± angustiora basi 3 mm. lata. Labellum obovato-cuneiforme 16 mm. longum 9 mm. latum sessile kasi latere lobis kasilaribus instructum, lobis basilaribus triangulari-

bus 3 mm. longis 2 mm. latis erectis apice sub-acutis, basi medio supra saccatim

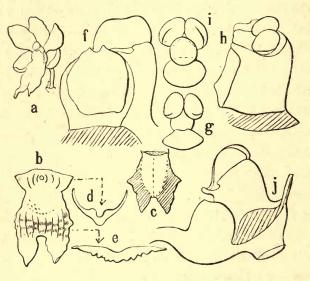


Fig. 41, Luisia megasepala Hayata; a, a flower; b, a lip, seen from above; c, the same, seen from below, shading shows purple colored parts; d, section of the part shown by a chain-line; e, section of another parts shown by another chain-line; f, a column; g, the same, seen from side; h, the same, anther taken off; i and j, pollinarium, seen from different sides; a, natural size, others more or less magnified.

impressum supra partem basilarem constrictum 41 mm. latum sursum dilatatum supra medium 9 mm. latum apice 2lobatum, (lobis triangulari-oblongis 3 mm. longis totiusque latis apice obtusis), margine medio lobulatum sursum et deorsum integrum crassiusculum, supra reticulato-sulcato impressum subtus læve, utraque pagine sub microscopio minute muricato - punctatum. Columna brevissima 4 mm. longa.

Hab. Formosa: cult. in seminario Taihoku, leg. B. Hayata, Aprili., 1914. Near L. teres Bl. and L. liukiuensis Schlecht.; but differs from them by the broader petals and sepals, and triangular basal lobes of the lip.

Diploprora Hook. f.

Diploprora kusukusensis Hayata sp. nov. (Fig. 42). Epiphyta. Caulis subteres 5–10 cm. longus vaginis foliorum obtectus. Folia alterna oblongo-lanceolata 8 cm. longa 2 cm. lata apice acuta ad summum brevissime 2–loba basi obtusa cum vaginis articulata subdistichum disposita margine integra —formiter falcata crassiuscula subconcolora, venis lateralibus parallelis in exsiccato elevatis. Racemi 5 cm. longi pauce floriferi, floribus 3–5, pedicellis divaricatis 5 mm. longis, bracteis late triangularibus 3 mm. longis medio plicatis rhachin amplectantibus. Flores subalbi vel leviter flavescenti-albi patentes 15 mm. in diametro. Sepalum posticum obovato-

oblongum 9 mm. longum 4 mm. latum 7-nervium apice rotundatum basi plus

minus angustius 21 mm. latum dorso medio carinatum, lateralia postico subæquiformia. Petala oblique oblongo - oblanceolata 8 mm. longa 3 mm. lata apice obtusa 5-nervia. Labellum latissime naviculiforme apice linearicaudatum ad summum bisetosum basi latissimum 4mm. latum sursum subito contractum ad caudam linearem 3 mm. longam productum, (cauda lineari deorsum laterale compressa sursum dorso compressa ad summum setis 2 instructa, setis 2 mm. longis subcrispis filiformibus), medio intus callo uno instructum, callo

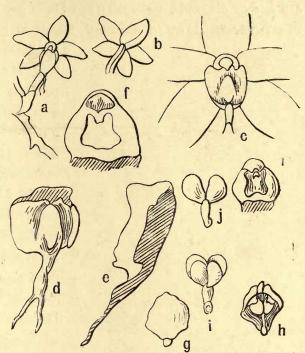


Fig. 42, Diploprora kusukusensis HAYATA; a, part of inflorescence and a flower; b, the same flower, seen from back; c, central part of the same flower; d, a lip, with transverse section; e, the same lip with vertical medial section; f, stigma, rostellum ad clinandrium; g, an anther; h, the same, seen from back; i, pollinarium; j, the same seen from back.

obtriangulari 3 mm. longo apice 2 mm. lato. Columna 2 mm. longa.

Hab. Kusukusu, Juni., 1912, leg. B. Hayata et S. Sasaki.

Very near D. Championi, but differs by the longer threads at the apex of the labellum and by the other points.

Diploprora uraiensis Hayata sp. nov. (Fig. 43). Epiphyta subpendula? Caulis 18 cm. longus toto foliosus vaginis foliorum obtectus. Folia crassiuscula oblongolinearia vel lineari-lanceolata 11 cm. longa 2 cm. lata —-formiter falcata apice inæqualiter breviter bi-lobata, lobis 1 mm. longis acutis, basi contracta cum vaginis articulata in exsiccato venis lateralibus parallelis elevatis, utraque pagine sub-concolora subdistichum disposita 1½ cm. a se remota, vaginis circ.

2 cm. longis ore truncatis. Racemi laterales 7 cm. longi pauce florati, floribus 4-5 remote dispositis, pedicellis 5 mm. longis patentibus, bracteis lanceolatis. Flores patentes 1½ cm. in diametro. Sepala et petala flava; columna alba;

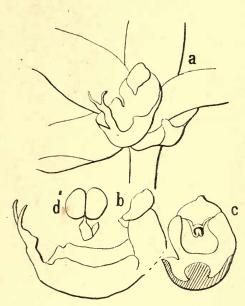


Fig. 43, Diploprora uraiensis HAYATA; a, central portion of a flower; b, the same seen from side sepals and petals taken off; c, a column with basal portion of a lip, seen from front; d, a pollinarium.

labellum album intus maculatum, maculis flavescentibus. Sepalum posticum oblongo-oblanceolatum 8 mm. longum 31 mm. latum apice obtuso-rotundatum basi angustatum 1½ mm. latum dorso medio carinatum, lateralia postico latiora. Petala oblique lineari-oblonga 8 mm. longa 3 mm. lata apice obtusa 5nervia. Labellum latissime naviculiforme apice lineari-caudatum ad summum setis 2 instructum cum cauda, setaque 8 mm. longum parte basilari latissima, 4 mm. lata 3 mm. longa quadrangulari intus callosa, (callo obtriangulari-oblongo basi acuto 3 mm. longo 11 mm. lato), apice subito contracta ad caudam abeunti, cauda lineari 2½ mm. longa setis filiformibus

suberispis $1\frac{1}{2}$ mm. longis duabus instructa. Columna $2\frac{1}{2}$ mm. longa. Capsula cylindrica utrinque acuta 4 cm. longa 1 cm. lata.

HAB. Uraisha, 1914.

Near D. kusukusensis Hayata, but differs from it by the smaller yellow flowers and larger leaves.

Saccolabium Blume.

Saccolabium formosanum Hayata (Fig. 44) Mater. Fl. Formos. p. 336. Herba epiphytica, caulibus foliatis non pseudo-bulbosis prostratis vaginis foliorum persistentibus instructis ad nodos radicantibus. Folia disticha carnosa plana oblonga 2 cm. longa 7 mm. lata apice obtusa breve apiculata basi in petiolum 2 mm. longum cum vaginis articulatum deciduum

contracta, vaginis 5 mm. longis persistentibus caulem obtegentibus. Racemi laterales breves 3 cm. longi pauciflorati, bracteis minutis scariosis, pedicellis 1 cm. longis, floribus mediocribus 13 mm. in diametro. Sepala æqualia libera pa-

tentia oblonga 5 mm. longa 3 mm. lata apice utrinque obtusa concava. Petala patentia sepalo subsimilia apice rotundata margine exteriore recurvata. Labellum ad basin columnæ sessile basi saccatum, saccis majusculis 6 mm. longis totiusque latis, ore contracto 4 mm. in diametro, lamina patenti latissima 4 mm. longa 1 cm. lata apice truncata latere divaricata Discus ad medium laminæ obtusa. incrassatus hirsutus. Columna brevis 14 mm. longa 3 mm. lata; rostellum 3-dentatum, dentibus desuper recurvis.

Hab. Arisan, in monte Morrison, leg. T. Kawakami et U. Mori, Mart. 1908, (No. 3164).

Somewhat near S. japonicum but differs from it in having flowers with longer peduncles. There is none like this at Kew.

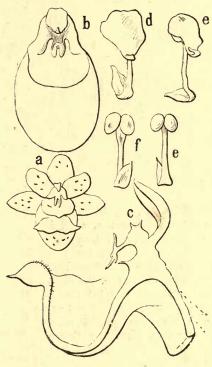


Fig. 44, Saccolabium formosanum Hayata; a, a flower; b, a lip and columna, lamina taken off; c, a lip, columna and a dorsal sepal, medially cut; d, pollinarium in an anther, seen from front; e, pollinarium, seen from front; f, the same, seen from back.

Saccolabium fuscopunctatum Hayata (Fig. 45) Ic. Pl. Formos. II. p. 143. Epiphyta, caulibus prostratis ad nodos radicantibus foliosis. Folia disticha alterna crassa angulo 90° a caule divaricata angustata vel angustato-oblonga 2 cm. longa vel longiora 4–5 mm. lata desuper arcuata apice acuta basi rotundata subsessilia supra 1–sulcata subtus plus minus convexa supra fusco-purpureo-punctata subtus fusco-purpureo-maculato-punctata, vaginis imbricatis cylindraceis 5 mm. longis ore obliquis basi angustis muculato-punctatis. Racemi breves pauciflorati, floribus 1–2. Flores flavescentes rubro-purpureo-

punctati 9 mm. in longo diametro, pedicells 1 cm. longis, bracteis oblongo-

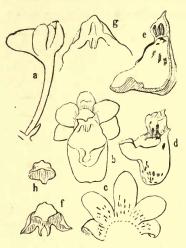


Fig. 45, Saccolabium fuscopunctatum Hayata; a, a flower
bud, seen from side; b, an opened flower, seen from front; c,
sepals and petals, explicated; d,
lip and columna; e, the same,
medially cut; f, apical portion
of a columna, rostellum and anther are seen; g, the same,
anther taken off, to show clinandrium; h, operculum, seen from
back.

triangularibus obtusis. Sepala patentia reflexa, posticum ellipticum 4 mm. longum 2½ mm. latum apice rotundatum basi truncatum non contractum, lateralibus cum postico æqualibus. Petala sepalis subæqualia. Labellum basi ad columnam adnatum plus minus cum alis columnæ continuum saccatum, sacco 5 mm. longo punctato-maculato ore contracto, lamina rotundata 2 mm. in diametro apice brevissime 2-lobata valde concava, disco ad medium laminæ sito incrassato hirsuto. Columna brevis 1 mm. longa 3 mm. lata, rostellum 2-dentatum.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Near S. formosanum, but differs by the maculated leaves and the much smaller rounded lobes of the labellum. Also near S. Matsuran Mak. from which this differs by the much larger flowers. It was brought back by myself from Arisan here to the Koishikawa

Garden, where it flowered in May, 1912, in a green house.

Saccolabium quasipinifolium Hayata (Fig. 46) Ic. Pl. Formos. II. p. 144. Epiphyta 4–5 cm. alta, radicibus teretibus incrassatis albicantibus 2mm. in sectione 20–30 cm. longis undulato-reflexis. Caules dense foliati 7–8 cm. longi, vaginis foliorum imbricatis. Folia 8–9 disticha alterna acerosa extrorse leviter recurvata subteretia cum vaginis circ. 10 cm. longa intus (supra) profunde sulcata extus (subtus) rotundata in sectione apice obtusa vel acuta basi cum vaginis articulata extus basi plus minus costata, vaginis dilatatis caulem semi-amplectantibus fusco-purpurascentibus explicato 7 mm. latis glabris. Racemi axillares 1–2–3-florati folium in longitudine æquantes, pedunculis 5–6 cm. longis ad medium bracteis unis instructeis, bracteis (non

floriferis) vaginiformibus 5-6 mm. longis obtusis. Flores apertientes 2 cm. in longo diametro $1\frac{1}{2} \text{ cm}$. in brevi diametro albo-viridescentes basi bracteis

unis instructi, bracteis (floriferis) circ. 1 cm. longis florem amplectantibus obtusis, pedicellis (cum ovariis) 8 mm. longis 5-6-sulcatis. Sepalum posticum obovatum 9 mm. longum obtusum basi non contractum 3-nervium dorso carinato - costatum. lateralibus valde obliquis posticum longitudine æquantibus acuto-obtusis latere inferiore latioribus dorso 4carinato-costatis. Petala sepalis subæqualia plus minus breviora 3-nervia carinato-costata. Labellum horizontaliter patens

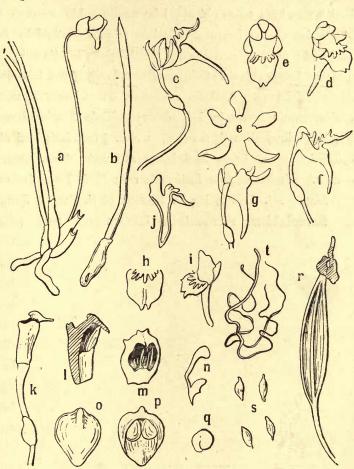


Fig. 46, Saccolabium quasipinifolium Hayata; a, the plant; b, a leaf; c, d, a flower, seen from side; e, the same, seen from front, e, detached sepals and petals; f, a flower, sepals and petals taken off, seen from side; g, the same, seen from back; h, lamina of the lip; i, a detached lip; j, the same, medially cut; k, a columna on the peduncle, anther taken off; l, the same, medially cut; m, the same, seen from front; n, a pollinarium, pollinia, caudicle and gland; o, an anther, seen from front; p, the same, seen from back; q, a pollinium; r, a fruit; s, seeds; t, threads in the capsule. a-j, and r, natural size; others variously magnified.

1 cm. longum 3-lobum 1-calcaratum, (calcari $1-1\frac{1}{2}$ cm.

longo retrorsum recurvo apice obtuso ore dilatato), lobis lateralibus ad latus faucis calcaris erectis latiusculis oblique triangularibus 4–5 mm. altis basi 6 mm. latis apice obtusis, lobo medio valde convexo 8 mm. longo 6 mm. lato apice obtuso breve 2–apiculato minute denticulato multi-nervio; disco basi lobi centralis transverse sito plurilobulato, lobulis calloso–lamellatis, lamellis 1–2 mm. longis obtusis. Columna 6 mm. longa 3 mm. lata alata, rostellum antice acutum 2–lobum. Anthera rubescens 3 mm. longa $2\frac{1}{2}$ mm. lata antice acuta postice medio 1–costata 1–locularis; pollinia 2 subglobosa sulcata, stipitibus lamellatis linearibus $3\frac{1}{2}$ mm. longis circ. $\frac{1}{2}$ mm. latis basi attenuatis. Capsula cylindrica apice breve basi longe attenuata 4 cm. longa 8 mm. lata multicostata. Semina minuta fusiformia cum fibris longissimis multis mixta.

HAB. Mt. Arisan, leg B. HAYATA et S. SASAKI, Jan., 1912.

Saccolabium retrocallum HAYATA sp. nov. (Fig. 47). Epiphyta.

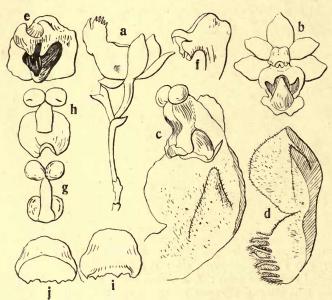


Fig. 47, Saccolabium retrocallum HAYATA; a, a flower on the inflorescence, purple colored portion is shaded; b, a flower, seen from front, purple colored parts are shaded; c, a columna and lip, the latter partially cut off; d, a lip, medially cut, showing a refracted callosity; e, columna, anther taken off, stigma and clinandrium are seen; f, the same, seen from side: g, a pollinarium, seen from front; h, the same, seen from back; i, an operculum, seen from front; j, the same, seen from back.

Caulis subteres in nostro specimine brevis 1½-2 cm. longus foliatus, internodiisbrevibus. Folia disticha elliptico-oblonga crasso-coriacea $2\frac{1}{2}$ cm. longa 1 cm. lata apice obtusa basi contracta cum vaginis articulata 9-nervia margine leviter desuper recurva, vaginis persistentibus 3 mm. longis imbricatis caulem obtegentibus. Pedunculi laterales simplices folio æquilongi 2 cm. longi basi medio apiceque

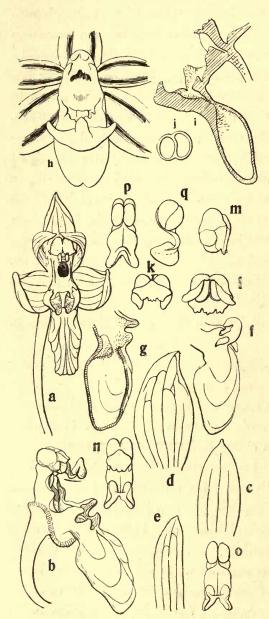
bracteis instructi, bracteis infimis tubiformibus 2 mm. longis, eis superioribus late triangularibus 1½ mm. longis. Flores in nostro specimine solitarii apertientes 1½ cm. in diametro. Sepala patentia distincta albo-flavescentia 5nervia, posticum ovato-oblongum 7 mm. longum 31 mm. latum apice obtusum basi leviter cuneato-contractum ad basin 11 mm. latum, lateralia angustiora quam postico ± obliqua 8 mm. longa 3 mm. lata apice acuta basi cuneatoangusta. Petala sepalo breviora angustato-oblonga 7 mm. longa 2½ mm. lata apice obtusa basi angustata. Labellum ad basin columnæ sessile patens in circumscriptione oblongum ecalcaratum sepalis longius 14 mm. longum 8 mm. latum concavum sursum medio valde crassum, callo uno triangulari retrorso instructum medio contractum, lobis lateralibus (vel auriculis) 2 mm. longis 5½ mm. latis margine minute ciliolatis, lobo terminali rotundato 7 mm. longo 8 mm. lato apice emarginato margine breve fimbriato. Labellum extus glabrum intus breve hirsutum intus prope callum ancori-forme purpureo-coloratum, (callo colorato), cæterum albicans. Columna brevis lata 1 mm. longa apoda exalata, clinandrium dentibus 2 instructum. Anthera terminalis opercularis incumbens, pollinia 2 globosa cerea vix sulcata; caudicula linearis 21 mm. longa, glandula cordato-rotundata parva. Fructus ignoti.

Hab. Formosa: loco non indicato; cult. in seminario Taihoku, leg. B. Hayata, Juni., 1912.

Remarkable for the large obtriangular retrorse callosities on the center of the lips.

Saccolabium Somai Hayata sp. nov. Epiphyta; caulis 7–8 cm. longus. Folia altera distiche disposita lineari-oblanceolata 14 cm. longa 17 mm. lata apice mucronato-acuta ad summum obtusa basi attenuata crassiuscula in exsiccato chartaceo-membranacea —-formiter recurva cum vaginis articulata, vaginis 5 mm. longis apice truncatis cum foliis articulatis nervosis. Racemi laterales 2 cm. longi pauci-florati. Sepalum posticum lineari-obovatum 6 mm. longum 3 mm. latum apice obtusissimum basi angustius 1 mm. latum 3—nervium, lateralia obovata 6 mm. longa $2\frac{1}{2}$ mm. lata 3—nervia apice obtusa basi cuneato-angustata. Petala sepalo subsimilia angustiora. Labellum sacciforme 7 mm. longum 5 mm. latum ore 3 mm. in diametro apice antice lamina late triangulari instructum, lamina transverse ——-formi 7 mm. lata $2\frac{1}{2}$ mm. longa medio

rugoso-crassa basi utraque latere auriculis instructa, auriculis rotundatis 11 mm. in diametro, margine subintegrum. ad centrum minute 1-foveolata, stipite lineari 11 mm. longo, glandula



Pollinia 2 ovoidea 1 mm. longa elliptica 1 mm. longa antice 2lobata.

HAB. Pinansha, leg. T. Soma, Mart., 1913.

Sarcanthus LINDL.

Sarcanthus fuscomaculatus HAYATA sp. nov. (Fig. 48) Epiphyta; radices aëriæ a latere caulis oriundæ simplices teretes albæ 5 mm. in diametro apice 2-3-divisæ. Caulis 30 cm. longus teres 5 mm. in diametro vaginis foliorum obtectus, vaginis 2-3 em. longis 1 cm. latis cum foliis articulatis. Folia linearia 16 cm. longa 17 mm. lata basi apiceque æquilata apice biloba (lobis inæqualibus 5-7 mm. longis 6 mm. latis) basi plicata cum vaginis articulata in exsiccato coriacea.

Fig. 48, Sarcanthus fuscomaculatus HAYATA; a, a flower; b, another flower, sepals, petals and terminal lobe of the lip taken off; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip, seen from side; g, the same in vertical section, terminal lobe taken off; h, a lip and column, seen from front; i, the same, in vertical section; j, transverse section of a spur; k, an operculum, seen from front; 1, the same, seen from back; m, the same, seen from side; n, pollinarium with an operculum; o, pollinarium, seen from front; p, the same, seen from back; q, the same, seen from

Panicula lateralis 20-25 cm. longa, pedunculis (partibus non floriferis) 10 cm. longis glabris, ramis 4-5 simplicibus 8 cm. longis gracilibus patentibus desuper recurvis, floribus a se 5 mm. remotis, bracteis triangularibus 2 mm. longis acutis 1½ mm. latis retrorse reflexis. Sepalum posticum 4½ mm. longum oblongum 21 mm. latum basi haud contractum obscure 3-nervium apice obtusum, lateralia oblonga 4½ mm. longa 3 mm. lata apice rotundato-obtusa basi haud contracta. Labellum ad pedem brevem columnæ affixum 4 mm. longum basi calcaratum, calcari 5 mm. alto 2 mm. lato apice obscure 2-lobo vel emarginato intus lamina una verticali partito 2-loculari intus prope orem hursuto ore callosis posterioribus lateralibusque semiclauso, lobis lateralibus latissime triangularibus 1 mm. longis 2 mm. latis erectis margine interiore recurvis apice obtusis, lobo terminali — -formi 2 mm. longo basi latissimo 4 mm. lato ad insertionem constricto 1 mm. lato 3-lobulato, lobulis basilaribus (lateralibus) triangulari-linearibus 2 mm. longis 1 mm. latis apice acuminatis, lobulo terminali anguste triangulari 1½ mm. longo 1½ mm. lato apice interiore incurvo cum facie connato. Columna 2mm.longa 1mm.lata a basi in pedem 1mm. longum alatum producta, anthera globosa 1 mm. in diametro 2-locularis. Pollinia 2, singulum 2-lobatum, stipite late lineari 1 mm. longo 1 mm. lato. Flores flavi; sepala et petala intus prope marginem fusco-punctato-maculata; columna basi fusco-maculata.

Hab. Formosa: loco non indicato; cult. in seminario Taihoku.

Cleisostoma Blume.

Cleisostoma brachybotrya Hayata sp. nov. (Fig. 49). Epiphyta. Caulis 7 cm. longus tota longitudine foliatus. Folia approximata subdistiche disposita linearia 15 cm. longa 3 cm. lata apice subtruncata subbiloba, (lobo altero longiore 6 mm. longo 5 mm. lato apice obtuso, lobo altero subnullo apice truncato) margine integra in exsiccato tenuiter coriacea basi ± contracta ad basin plicata cum vaginis articulata, vaginis imbricatis non cylindraceis plicatim caulem amplectantibus 2 cm. longis in explicato 2 cm. latis nervosis. Racemi axillares 3 cm.longi vel longiores, pedunculis (partibus non-floriferis) 1½ cm. longis, partibus floriferis cylindrico-globosis 2–3 cm.longis vel longioribus 2 cm. latis, bracteis late triangularibus 2 mm. longis basi totiusque latis pedicellum amplectantibus, pedicellis 2 mm. longis divaricatis glabris,

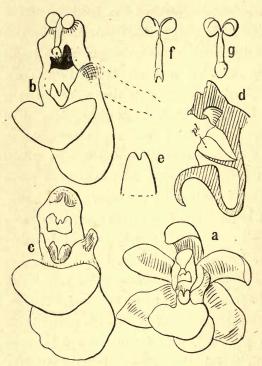


Fig. 49, Cleisostoma brachybotrya HAYATA; a, a flower; b, a lip and column; c, the same, anther taken off; d, the same, in vertical section; pl, transversal plate; e, transversal plate at the mouth of the sac; f, g, pollinaria, seen from different sides. shaded portions fig. in a, b and c, show purple coloration.

3 mm. longis ovariis 1mm. latis cylindraceis. Flores apertientes 6 mm. in diametro; sepala et petala crassa extus viridi-flavescentia intus apice basique purpurascentia; labellum albescens basi utroque latere purpureo-maculatum. Sepalum posticum obovatum 5 mm. longum 2½ mm. latum 3-nervium apice obtusum basi 1½ mm. latum ± concavum, lateralia late obovata 4 mm. longa 3 mm. lata apice obtusissima basi 2 mm. lata subplana trinervia, nervis vix visis. Petala lineari-spathulata 41 mm. longa 1½ mm. lata apice obtusa basi angustata, nervis haud visis. Labellum basi columnæ affixum basi saccatum, sacco 4 mm. profundo 23 mm. lato ore squama posteriore lineari 2 mm. longa apice 2-loba sub-clauso, 3-lobum,

lobis lateralibus ad orem sacci erectis brevioribus, lobo terminali antice patenti desuper recurvo late rotundato vel transverse semi-rotundo apice acuto-obtuso 3 mm. longo 4 mm. lato basi contracto 2 mm. lato. Columna $1\frac{1}{2}$ mm. longa basi contracta 1 mm. lata apice dilatata $1\frac{1}{2}$ mm. lata.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, leg.B. HAYATA Mart. 1914.

Cleisostoma ionosma Lindl.; Hayata Ic. Pl. Formos. II. p. 134. Stauropsis luchuensis Rolfe in Kew Bull. 1907, p. 131.

Hab. Formosa: Kusukusu, leg. B. Hayata et S. Sasaki, 1912, Juni. Cleisostoma oblongisepala Hayata (Fig. 50) Ic. Pl. Formos. II.

II. p. 134. Herba epiphytica, radicibus teretibus 3-4 mm. in sectionis diametro, caulibus 25 cm. longis a basi usque ad apicem foliosis teretibus 4-5 mm. in sectionis diametro, vaginis foliorum imbricatis caulem amplectantibus glabris. Folia crassa viridia glabra disticha alterna angustata 10 cm. longa 17 mm. lata apice aristato-acuta basi abrupte contracta ad vaginam abeuntia supra ad costas impressa, supra plana, costis et venis non visis,

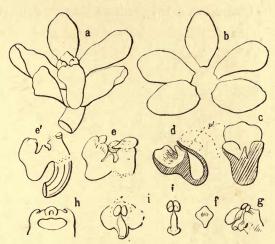


Fig. SO, Cleisostoma oblongisepala Hayata; a, a flower; b, detached sepals and petals; c, a labellum, seen from front, vertical plate is seen; d, the same, seen from side, medially cut; e, columna and labellum; f, an anther; g, apical portion of the columna, seen from side, pollinarium is seen; h, the same, seen from front, stigma and horseshoe-shaped glands are seen; i, a pollinarium.

basi plus minus tortuosa cum vaginis articulata, margine integra plus minus recurvata, vaginis cylindraceis circ. 3 cm. longis ore truncato-obliquis. Racemi axillares breves 2 cm. longi pauciflorati. Flores apertientes 1 cm. in diametro albicantes centro rubescentes, pedicellis brevibus (cum ovariis) 4 mm. longis triquetris 3-costatis, bracteis brevibus 1-2 mm. longis triangularibus basi dilatatis pedicellum semi-amplectantibus. Sepala: posticum oblongum 7 mm. longum 4½ mm. latum apice rotundatum concavum, lateralia plus minus obliqua breviora quam postico. Petala obovato-oblonga 6½ mm. longa 3½ mm. lata. Labellum plus minus versus apicem rubescens ad columnam adnatum 4½ mm. longum basi saccatum, (sacco brevi squama postica clauso, squama lineari minute hirtella), 3-lobatum, lobis lateralibus minutis ad latus oris sacci adnatis obtusis dentiformibus, lobo medio erecto emarginato centro mucronato intus hirtellato. Anthera 2 mm. longa antice breve producta. Pollinia 4, per paria conferta, stipite hyalino; Columna apice rubescens 3 mm. longa.

HAB. Botansha, leg. C. Ōwatari, 1898. The orchid was brought back to the Koishikawa Garden by Mr. C. Owatari in his first expedition to Formosa.

Cleisostoma taiwaniana HAYATA n. n. (Fig. 51). Sarcanthus taiwania-

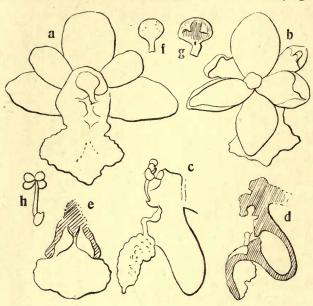


Fig. 51, Cleisostoma taiwaniana HAYATA; a, a flower; b, the same, seen from back, ovary taken off; c, a lip and columna, seen from side; d, the same, medially cut, anther taken off; e, a lip, detached from columna to show lateral appendages and vertical thickening; f, an operculum, seen from front; g, the same, seen from within; h, pollinarium.

nus HAYATA in Mater. Fl. Formos. p. 337.

Owing to an erroneous observation, it was first recorded that this orchid has a spur divided by a longitudinal plate and consequently was regarded as a species belonging to Sarcanthus. Afterwards, I became aware of that this has no plate but thickenings. It should, therefore, be transferred from Sarcanthus to Saccolabium.

OBSERV. Herba epiphytica, caulibus

erectis validis teretibus foliatis non pseudo-bulbosis 25 cm. longis, vaginis persistentibus caulem obtegentibus. Folia disticha carnosa plana late linearia 30 cm. longa 4 cm. lata apice oblique emarginata sessilia cum vaginis articulata, vaginis persistentibus 5 cm. longis. Paniculæ laterales quasi-axillares validiusculæ recurvæ ramosæ, ramis 5-6 divaricatis validiusculis 4 cm. longis, bracteis minutis squamosis triangularibus. Flores parvi 1 cm. in diametro breve pedicellati flavo-viridescentes intus purpurascentes, pedicellis 2-3 mm. longis transverse divaricatis. Sepala libera æqualia patentia carnosula obovato-oblonga 5 mm. longa 3½ mm. lata apice obtusa. Petala sepalo angustiora 4 mm. longa 1½ mm. lata apice rotundata postice reflexa. Labellum basi columnæ affixum continuum patens basi calcaratum, (calcari breve cylind-raceo 3 mm. longo 1½ mm. lato ore antice lamina longitudinali semi-diviso, ad os postice latereque calloso-appendiculato), 3-lobatum, lobis lateralibus ad

latus calcaris sitis brevibus auriculiformibus, lobo medio latiusculo 3 mm. longo 5 mm. lato semiorbiculari apice rotundato margine denticulato medio late calloso-

ruguloso patenti.
Columna breve oblonga
subteres 2 mm. longa.
Clinandrium truncatum.

Hab. Formosa, leg. T. Uchiyama, 1899. Physurus Rich.

Physurus chinensis Rolfe (Fig. 52); Matsum. et Hayata Enum. Pl. Formos. p. 409.

Hab. Mt. Arisan, leg. B. Hayata et T. Itō, Mart. 1914.

This orchid drawn in the accompanying

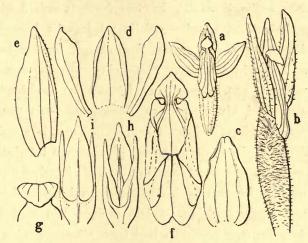


Fig. 52, Physurus chinensis Rolff; a, a flower, slightly expanded; b, the same, seen from side; c, a hood formed by a dorsal sepal and petals; d, the same, separated; e, a lateral sepal; f, a lip, seen from inner side; g, apical portion of the same; h, apical portion of column, seen from front; i, the same, seen from back.

figures is perhaps identical with ROLFE's species, so far as the original description is concerned. The type I have never seen.

Anæctochilus Blume.

Anœctochilus bisaccatus Hayata sp. nov. (Tab. XV.) Odontochilus bisaccatus Hayata in sched. Herb. Taihoku. Terrestris, radices paucæ incrassatæ. Caulis cum racemis 20–25 cm. longus teres subglaber, internodiis inferioribus 4 cm. longis, superioribus 2 cm. longis inferiore defoliatus infra medium usque ad basin racemi foliatus suberectus vel ascendens. Folia alterna a se 2 cm. remota petiolata, lamina oblonga 4½ cm. longa 2 cm. lata apice acuta vel obtuso-acuta ad summum mucronata basi acuta supra atroviridi ad costas albo-lineata subtus sub-pallida, petiolis (vaginis exceptis) 6 mm. longis gracilibus basi dilatatis ad vaginas expantibus, vaginis 5–7 mm. longis 4 mm. latis cylindricis hyalinis ore obliquis latioribus, foliis superioribus minoribus in racemis ad bracteas reductis. Racemi hirsuti 5 cm. longi

basi non floriferi, partibus non floriferis 1½ cm. longis hirsutis, bracteis non floriferis sessilibus lanceolatis basi amplexicaulibus 14 mm. longis 4 mm. latis apice acutis 3-nerviis, bracteis floriferis sub floribus lanceolatis pedicellos amplectantibus margine ciliatis vel hirsutis lanceolatis 12 mm. longis 3 mm. latis, pedicellis cum ovariis 7 mm. longis bractea brevioribus glabris gracilibus 1 mm. in diametro. Flores cinereo-flavescentes. Sepalum posticum late ovatum 41 mm. longum 3 mm. latum apice caudato-obtusum ad summum obtusum basi vix contractum 1-nervium, venis non visis, glabrum; sepala lateralia oblique oblonga 6 mm. longa 3 mm. lata apice obtusa basi contracta latere superiore 1 mm. lata, margine sursum interiore recurva, latere inferiore 2 mm. lata margine deorsum prope basin interiore recurva, duo basi se connata saccum 2-lobatum formantia saccum vel calcar labelli involventia 1-nervia utraque pagine glabra. Petala obliqua late semi-ovata 5 mm. longa 21 mm. lata apice caudato-obtusa basi breve attenuata basin contracta subfalcato-curva cum sepalo posteriore connata galeam formantia 1-nervia latere exteriore 2 mm. lata latere interiore 1 mm. lata glabra. Labellum Y-forme perfecte liberum ad basin columnæ adnatum basi saccatum, sacco globoso 2 mm. lato 1½ mm. longo profunde 2-sacculato (sacculis apice 2-lobatis) basi intus medio posteriore callosis duobus instructo (callis cornuformibus 13 mm. longis ascendento-recurvis), latere oris sacci utroque 1-appendiculatum, appendiculis minutis 1 mm. longis crassis, mesochilo 6 mm. longo lineari margine pectinato, dentibus pectinis utroque latere 3-4-5, superioribus longioribus linearibus 3 mm. longis 1 mm. latis apice obtusis, medio secus longitudinem 2-lamellato, lamellis linearibus 4 mm. latis sursum ad lobos laminæ abeuntibus, lamina (epichilo) 2-lobata, lobis oblique obovato-rectangularibus 5 mm. longis 3 mm. latis a se angulo 50° divaricatis apice rotundato-obtusis, sinibus inter lobos triangularitruncatis. Discus medio mesochili ad medium 1-striatus. Columna brevissima 1 mm. longa antice 2-appendiculata, appendiculis alæformibus, apice cornuformibus suberectis triangularibus apice obtusis crassiusculis 1 mm. latis. Clinandrium dorsale profunde concavum. Anthera dorsalis erecta sessilis ovata 2 mm. longa 1 mm. lata apice longicaudata basi cordata. Pollinia 2, singulum clavato-obovatum apice 2-lobatum basi attenuatum ad pseudocaudiculam unam se connatum. Rostellum 2-partitum, (partibus rostriformibus apice cartilaORCHIDEE. 101

gineo-acuminatis sub-tortuosis, latere exteriore appendiculatis). Stigma sub rostello 2-partitum, partibus subrotundatis subplanis, vel medio sub-lobato-plicatum. Ovarium cyrindricum tortuosum 9 mm. longum 1²/₃ mm. in diametro glabrum sed minute muricatum.

HAB. Rinkiho, ad 5000 ped. alt., 1911, Aug.

Near Odontochilus lanceolatus Benth. (Anactochilus lanceolatus Lindl.) (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. VIII. t. 392); but differs by the shape of the lips and their appendages.

Anœetochilus formesanus Hayata sp. nov. (Fig. 53). Caulis circ. 20 cm. longus inferiore foliatus glaber. Folia ovata vel rotundato-ovata 4½ cm. longa 27 mm. lata apice acuta vel acuto-mucronata basi rotundata ad extremitatem subito acuta ad petiolum abeuntia 5-nervia supra velutinosonitida elegante aureo-reticulata subtus (in exsiccato) rubescentia. Caulis florifer 4-5 cm. longus pauci-floratus, rhachibus hirsutis, bracteis ovato-lanceolatis

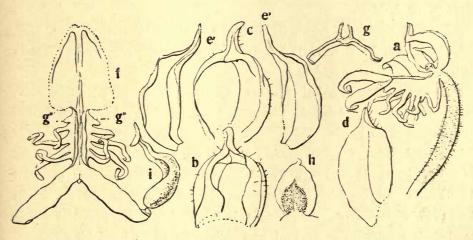


Fig. 53, Anactochilus formosanus Hayata; a, a flower; b, a hood, formed by a dorsal sepal and two petals; c, a dorsal sepal, e, é, petals; f, a lip; g, a section of a portion mentioned by g' g'' in fig. f; h, an anther, dorsal view; i, a pollinarium.

1 cm. longis concavis basi contractis alabastrum floris amplectantibus extus hirsutis intus glabris, pedicellis nullis, ovariis cylindrico-fusiformibus $1\frac{1}{2}$ cm. longis ad utramque extremitatem angustatis breve hirsutis. Sepalum posticum cuspidato-rotundatum 6 mm. longum $5\frac{1}{2}$ mm. latum dorso hirsutum intus glabrum valde concavum cum petalis connatum galeam formans apice exteriore

reflexum apice cuspidatum, cuspide 1 mm. longo apice obtuso, margine incurvum 1-nervium, lateralia ovato-oblonga valde obliqua 8 mm. longa 4½ mm. lata apice breve cuspidata ad summum obtusa 1-nervia extus hirsuta intus glabra patentia. Petala semi-ovata valde obliqua 7 mm. longa 2½ mm. lata apice cuspidata, cuspide 2 cm. longo, 1-nervia cum sepalo postico conniventia galeam formantia. Labellum Y-forme, mesochilo 5-6 mm. longo ad longitudinem plicato subtus medio 1-costato ad costam fimbriis 2-seriatis instructo, fimbriis lineari-filiformibus 5 mm. longis ½ mm. latis, lamina (epichilo) profunde 2-lobata, lobis lineari-angustatis 7 mm. longis 3 mm. latis apice obtusis divaricatis; calcar sacciforme triangulare 4 mm. longum 3 mm. latum intus prope basin latere anteriore 2-tuberculatum, tuberculis lamelliformibus 1½ mm. longis ½ mm. latis obscure denticulatis. Columna brevis 1 mm. longa, anthera oblonga 4 mm. longa.

HAB. Formosa: loco non indicato: cult. in Taihoku seminario, leg. B. HAYATA, 1914, Mart.

Near A. Roxburghii Lindl. (Orchids of the Sikkim Himalayas, Ann. Roy. Bot. Gard. Calc. VIII. t. 390); but differs from it by the cream-yellow flowers with more fimbriate mesochils.

Ancectochilus Inabai Hayata sp. nov. (Tab. XVI.) Terrestris; caulis incrassatus 3–4 mm. in diametro teres inferiore glaber, internodiis superioribus 2 cm. longis. Folia 2 cm. a se remota alterna, lamina ovato-oblonga vel oblonga apice acuta vel acuto-acuminata basi rotundata vel rotundato-obtusa 4½ cm. longa 2 cm. lata glabra, petiolis (vaginis exceptis) 1 cm. longis basi gradatim ad vaginam dilatatis, vaginis 12 mm. longis 4 mm. in diametro ore obliquissimis basi cylindricis, partibus cylindricis brevissimis semihyalinis. Racemi cum pedunculis 13 cm. longi hirsuti, partibus floriferis 5–6 cm. longis, partibus non floriferis (pedunculis) 7–8 cm. longis erectis bracteis 2–3 instructis, bracteis non floriferis lanceolatis hirsutis rubescentibus 1 cm. longis semi-amplexicaulibus, bracteis floriferis sub flore ovato-lanceolatis 1 cm. longis apice acuminatis hirsutis rubescentibus basi ± contractis obtusis, pedicellis nullis, ovariis cylindricis vel cylindrico-ovatis 1 cm. longis. Flores rosei. Sepala inæqualia, posticum ovatum vel late ovatum 5½ mm. longum 3½ mm. latum apice subcaudato-obtusum ad apicem uncinato-

obtusum basi ± contractum 1-nervium, venis utroque latere nervi 1-2 alternis, fusco-viride sed prope marginem et secus nervos et venas laterales album intus glabrum extus glanduloso-barbatum basi cum petalis connatum galeam formans; sepala lateralia falcato-oblonga 11 mm. longa obliqua 4½ mm. lata apice acuto-obtusa basi cum basi labelli et se connata. Petala lunuliformia linearia falcato-curva obliqua 7 mm. longa 1½-13 mm. lata quam sepalo postico vix longiora vel æquilonga apice acuto-obtusa basi vix contracta utraque glabra basi ad sepalum posticum adnata sursum subconnata galeam formantia, saccum labelli involventia intus glabra extus glanduloso-barbata 1-nervia, (venis lateralibus utroque latere nervi 3 alternis acute ascendentibus), fusco-viridia prope marginem secus nervos venasque albo-reticulata. Labellum Y-forme cum hypochilo mesochilo epichiloque 23 mm. longum basi saccatum cum sepalis lateralibus connatum mentum 1-2 mm. longum formans, sacco globoso 3 mm. longo basi leviter 2-lobo, lobis basi interiore callo uno instructis, callis lamellformibus rectangularibus 1mm. longis, lamina (epichilo) longe unguiculata, ungue (mesochilo) in ambitu lanceolato-lineari 9 mm. longo 2-3 mm. lato plus minus crassiusculo longe pectinato (dentibus pectinis inferioribus brevibus, superioribus longioribus 7-8 mm. longis angulo 45° antice divaricatis) medio secus longitudinem 2-lamellato, lamellis sursum ad lobos laminæ abeuntibus, lamina (epichilo) alte divaricatim 2-lobata ad sinus inter lobos obtuso-mucronata, lobis divaricatis oblique rectangulari-oblongis 1 cm. longis 5-6 mm. latis apice truncato-obtusis, (sinibus inter lobos rotundato-cuspidatis), margine integra glabra. Columna circ. 3 mm. longa 4 mm. lata dorso complanata; anthera dorsalis verticaliter sita (posterior) cordato-ovata 3 mm. longa 2 mm. lata apice caudato-acuta basi subcordata sessilis 2-locularis; pollinia 2, bipartita vel apice 2-lobata cum pseudocaudicula 4 mm. longa clavato-obovata, pseudocaudicula 1 tortuoso 1; mm. longa, glandula oblonga ; mm. longa. andrium valde concavum latere ad rostellum abeuns; rostellum subcartilagineum rotundatum apice aristato - 2 - lobatum; stigma duo, singulum circ. connatum vel distans infra rostellum situm, appendiculis columnæ 2 cornuformibus infra stigma sitis ascendentibus crassis 1 mm. longis Ovarium sessile cylindricum 9 mm. longum 2 mm. in diametro obtusis. hirsutum.

Odontochilus Inabai HAYATA (Herb. Taihoku).

Hab. Rinkiho, ad 5000 ped. alt., leg. H. Inaba, Aug. 1911, fl. rosei, (fide Inaba).

Near Odontochilus grandiflorus BENTH. = Anæctochilus grandiflorus LINDL. (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. VIII. t. 393), but differs from it by the much longer pectinate claws of the lips and in having hairly sepals.

Anæctochilus koshunensis Hayata sp. nov. (Fig. 54). Radices in-Caulis teres solitarius (cum racemis) 16 cm. longus basi 3 mm. crassus a basi usque ad medium foliatus supra medium vaginato-squamatus sursum spicatim florifer simplex incrassatus rubero-purpurascens (in exsiccato) deorsum subglaber sursum pubescens prope basin minus foliatus, prope medium approximatim foliatus, supra medium usque ad apicem aphyllus. Folia alterna ad medium caulis approximatim 3-4 sita petiolata, lamina rotundato-ovata 21 cm. longa 18 mm. lata apice obtuso-acuta mucronatim acuta basi rotundata ad petiolum acuta margine integra crassiuscula utraque pagine glabra in exsiccato membranacea supra in exsiccato fuscenti subtus rubropurpurascenti 5-nervia, nervis parallelis lateralibus infra apicem ad nervum centralem attingentibus, venis et venulis reticulatis, supra ad nervos venas venulasque albo-reticulata, petiolis cum vaginis 1 cm. longis linearibus, partibus linearibus 5 mm. longis 1 mm. latis plicatis paullo pubescentibus, vaginis 3-5 mm. longis ore oblique truncatis 5 mm. latis circ. 10-nerviis semi-hyalinis rubescentibus. Spicæ simplices 5-6-floratæ 4½ cm. longæ, pedunculis (partibus caulis aphyllis) 7 cm. longis 2-3 bracteatis, bracteis sub flore ovatis rubescentibus 7 mm. longis 3-4 mm. latis apice cuspidato-acuminatis 1-nerviis alabastrum floris amplectantibus întus glabris extus pubescentibus. Flores alterni breve pedicellati vel subsessiles suberecti. Sepala inæqualia; posticum late rotundato-ovatum 5 mm. latum totiusque longum basi non contractum apice cuspidatum ad summum obtusum intus glabrum extus pubescens 1-nervium intus valde concavum sursum valde reflexum cum petalis connatum galeam formans dorso ad nervum elevatum; lateralia oblique oblonga plus minus patentia 8 mm. longa 4 mm. lata valde concava oblique apice obtusa basi non contracta 1-nervia, nervis recurvis, intus glabra extus pubescentia rubescentia, nervis

dorso elevatis ascendentibus. Petala tenuissima hyalina valde obliqua semi-

obovata apice cuspidato-acuta basi attenuato-contracta sursum reflexa latere superiore cum sepalis adnata galeam formantia valde obliqua latere inferiore 23 mm. lata latere superiore 10 mm. lata 6 mm. longa 1 - nervia utraque pagine glabra. Labellum glabrum basi ad basin columnæ adnatum longe calcaratum (calcari ad orem valde obliquo latere posteriore 5mm. longo latere anteriore 9-10 mm. longo medio 2 mm. lato intus latere posteriore infra columnam proboscis 2 instructo deorsum antice plus minus recurvo ad apicem 2 - lobato, lobis 2 mm. longis

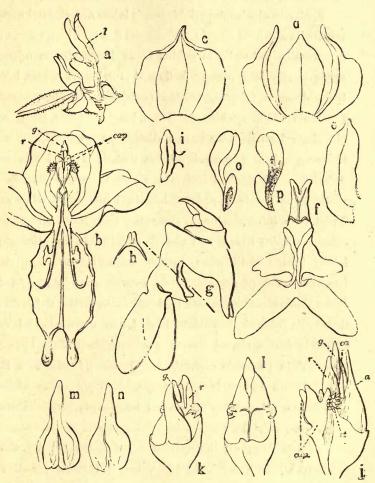


Fig. 54, Anactochilus koshunensis Hayata; a, a flower; b, another flower, lamina of the lip taken off, spur explicated, to show columna, columnal appendages, stigmata, rostellum, gland and two basal appendages of the spur; c, a dorsal sepal and petals, connated into a hood; d, a dorsal sepal and petals, separated; e, a lateral sepal; f, a detached lip, seen from face; g, the same lip, with columna and anther, seen from side; h, cross section of the same at chain-line; i, a basal appendage of the spur; j, a columna, seen from side; k, the same, seen from back; l, the same, anther taken off, showing clinandrium; m, an anther, seen from front; n, the same, seen from back; o, pollinarium, seen from face; p, the same, seen from back.

l=lip; cap=columnal appendages; r=rostellum; g=gland; cd=caudicle of pollinia; a=anther; st=stigma.

1 mm. latis apice obtusis rectis, versus orem antice utroque latere lobis erectis triangularibus instructum (lobis acutis latere anteriore ad mesochilum abeuntibus), mesochilo a calcari angulo 90° egresso 3-4 mm.longo secus medium plicato margine conduplicato-plicato subtus secus longitudinem appendiculis 2 instructo, appendiculis late pinni-formibus 4 mm. longis 2 mm. latis apice antice obtusis desuper falcatis, lamina (epichilo) bipartita, partibus verticaliter sitis parallelis oblique oblongis 8 mm. longis 31 mm. latis apice rotundatis vel obtusis, ad sinus inter partes distincte mucronata, mucrone desuper reflexo. Columna a basi usque ad apicem rostelli 3 mm. longa basi constricta latere anteriore appendicibus instructa, appendicibus anterioribus 2 alæformibus, alis verticalibus parallelis apice 2-lobatis, lobis superioribus magnis triangularibus 1 mm. latis intus sacciforme excavatis, lobis inferioribus minoribus; appendices columnæ apice liberæ sub rostello rostelliformes; stigmata 2 distantia utroque latere basi rostelli sita; rostellum cartilagineum validum 2-fidum 1 mm. longum; anthera dorsalis erecta sessilis lanceolato-ovata 4 mm. longa 1½ mm. lata apice rostrato-attenuata basi rotundata leviter 2-lobata 2-locularis; pollinia 2 sectilia obovato-lanceolata basi longe attenuata ad caudiculas abeuntia; glandula fusiformis, ad utramque extremitatem acuta 14 mm. longa 4 mm. lata; clinandrium profunde excavatum. Ovarium fusiforme a lamina labelli angulo 90° egressum 12 mm. longum 4 mm. latum pubescens utrinque contractum basi plus minus attenuatum sessile vel brevissime pedicellatum.

HAB. Köshün.

Differs from all the species of Anactochilus by the mesochil which is not afforded with pectinate lobes, but has broadly entire wingformed lobes, by the columnal appendages which are doubly folded and beak-shaped at the apex, and by the triangular lateral lobes at the mouth of the spurs. It may constitute a new genus (Aviglossum, I should propose to call it), when the above mentioned characters are fully ascertained by the study of a living material.

Zeuxine LINDL.

Zeuxine arisanensis Hayata sp. nov. (Fig. 55). Terrestris; radices paucæ incrassatæ. Caulis cum racemo terminali 25 cm. longus supra basin usque ad infra medium foliatus. Folia in exsiccato tenuiter membranacea.

ovata vel ovato-lanceolata apice acuta basi obtuso-rotundata ad petiolum contracta 4 cm. longa $1\frac{1}{2}$ cm. lata, petiolis (cum vaginis) $1\frac{1}{2}$ cm. longis basi dilatatis vaginiformibus caulem amplectantibus. Partes floriferæ 6 cm. longæ, partibus inter floriferam et foliiferam 11 cm. longis hirsutis squamatis, squamis $1\frac{1}{2}$ cm. longis apice acuminatis basi vaginiformibus caulem amplectantibus a se 3 cm. remotis subrubris tenuiter scariosis. Flores densiuscule dispositi lineariovoidei 8 mm. longi $2\frac{1}{2}$ mm. lati hirsuti, bracteis lanceolatis. Sepalum posticum valde concavum ovatum 5 mm. longum apice acuto-obtusum basi leviter contractum 1-nervium vel obscure 3-nervium extus hirsutum intus gla-

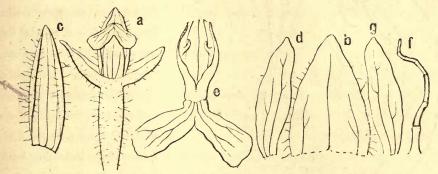


Fig. 35, Zeuxine arisanensis HAYATA; a, a flower; b, a dorsal sepal, expanded; c, a lateral sepal; d, d,' petals; e, a lip; f, a hair on the flower.

brum cum petalis connatum galeam formans, lateralia oblique ovata 4 mm. longa 2 mm. lata apice acuto-obtusa interiore recurva basi ± contracta extus hirsuta intus glabra 1-nervia vel obscure 3-nervia. Petala semi-oblonga 4½ mm. longa 1¾ mm. lata apice obtusissima basi leviter contracta 1-nervia, nervo valde excentrico, utraque pagine glabra. Labellum Y-forme, lamina tenuis 2-lobata, lobis angulo 70° a se divaricatis quadrangularibus apice obtusis 2½ mm. longis 1 mm. vel 1½ mm. latis, ungue crasso 1 mm. lato deorsum latiore cum columna connato tubum breve formanti margine intus carinato basi intus 2-tuberculato 3 mm. longo. Columna 1-2 mm. longa. Rostellum alte 2-lobatum, lobis linearibus 1 mm. longis.

Hab. Arisan, leg. S. Sasaki, Mart., 1911.

Near Zeuxine reflexa KING et PANTLING (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. VIII. t. 388), but differs from it by the shape of the columnal appendages.

Cheirostylis Blume.

Cheirostylis Inabai Hayata sp. nov. (Fig. 56). Caulis ascendens 10–15 cm. altus tota longitudine foliatus, foliis inferioribus minoribus iis superioribus majoribus. Folia ovata 2 cm. longa 12 mm. lata apice acuta vel obscure mucronato-acuta basi rotundata subito ad petiolum abeuntia a se 2 cm. remota in

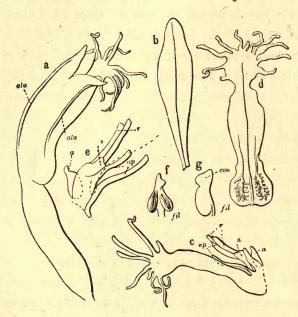


Fig. 56, Cheirostylis Inabai HAYATA; a, a flower; b, a petal; c, a flower, sepals and petals taken off; d, a lip; e, columna; f, an anther, seen from face; g, the same, seen from side; a=anther, r=rostellum, ap.=columnal appendages, s=stigma, ala=wings, fil=filament.

exsiccato tenuiter membranacea, petiolis 11 cm. longis apice 2 mm. latis deorsum dilatatis prope basin vaginiformibus, partibus vaginiformibus 5 mm. longis totiusque latis. Flores pauci racemosi, racemis terminalibus simplicibus 2-3 cm. longis, pedunculis (partibus non floriferis) 1 cm. longis breve hirsutis, bracteis ovatolanceolatis 8 mm. longis 2 mm. latis apice acuminatis, pedicellis hirsutis 2 mm. longis, ovariis cylindricis 1 cm. longis 2 mm. latis. Flores albi oblique cylindracei subdeclinati 1 cm. longi

(ovariis exceptis) 4 mm. lati apice \pm angustiores basi rotundato-contracti. Sepala lineari-lanceolata 1 cm. longa $2\frac{1}{2}$ mm. lata medio dorso carinato-alata ad marginem a basi usque ad prope apicem connata tubum formantia, tubo subdeclinato basi antice obscure vel vix ventricoso apice 3-lobato lobis oblongo-triangularibus 3 mm. latis apice acutis. Petala lineari-spathulata 10 mm. longa $2\frac{1}{2}$ mm. lata apice obtusa deorsum attenuata tenuissima subhyalina erecta sublibera sursum \pm sepalo postico adnata 1-nervia. Labellum erectum clavato-angustatum eirc. 10 mm. longum apice a tubo sepalorum exsertum sursum supra medium contractum, parte supra contrationem rotundata 2 mm. in dia-

metro crassiuscula supra minute villosa margine fimbriata, fimbriis $2\frac{1}{2}$ mm. longis, ad contractionem $1\frac{1}{2}$ mm. latum, parte infra contractionem angustata 8 mm. longa 2 mm. lata lævi basi subventicosa, ventriculo sub 2-lobato intus 3-nervio ad nervos laterales fimbriis 2-seriatis instructo. Columna circ. 1 mm. longa; appendiculæ columnales lineares, partibus liberis 3 mm. longis $\frac{1}{2}$ mm. latis. Rostellum alte 2-partitum, partibus linearibus $3\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis apice truncatis.

Hab. Rinkoho, ad 5000 ped. alt., leg. H. Inaba, Aug., 1911.

Near. Cheirostylis chinensis, but differs from it by the much larger leaves which are arranged from the base of the stems to the base of the peduncles.

Arisanorchis HAYATA n. g.

Sepala membranacea a basi usque ad prope apicem in tubum coalita subæqualia ± declinata basi antice in saccum brevissimum producta. Petala sursum sepalo postico adnata deorsum libera. Labellum a basi columnæ erectum angustum petalo conforme elongato-oblongum circ. æquilatum apice non dilatatum intus non callosum ecalcaratum apice desuper leviter recurvum. Columna brevis apice brachio uno vel brachiis 2 erectis linearibus rostello æquilongis appendiculata. Stigmata distantia utroque latere basis rostelli sita. Rostellum alte 2-partitum, partibus acuminatis erectis. Clinandrium breve profunde excavatum. Anthera erecta acuminata 2-locularis, loculis se separatis. Pollinia sectilia, caudicula oblanceolata glandula lineari peltata inter partes rostelli sita. Herba aphylla terrestris debilis. Rhizoma repens tuberiferum. Scapi aphylli vaginis instructi simplices erecti. Flores parvuli in racemo laxiusculo dispositi breviter pedicellati.

HAB. Formosa. Species unica.

The new genus is more or less related to Gastrodia, Aphyllorchis, Epipogon and Galera, in its leafless habit. It is, however, closely allied to Cheirostylis in the gamophyllous perianth, deeply sinuate rostellum, sectile pollinia, one or two armed columnal appendages and stigmatic tissue at the base on each side of the rostellum. But it differs from it by the aphyllous habit, and by the nearly included long entire labellum with no distinction of a blade and claw and with no swelling at the base.

Arisanorchis Takeoi Hayata, n. sp. (Fig. 57). Terrestris, tuberibus oblongo-ovoideis horizontaliter sitis circ. 1mm.longis 5mm. in diametro carnosis flavescenti-rubescentibus singulis vel moniliforme continuis, apice scapum singulum emittentibus. Scapi erecti circ. 15 cm. longi aphylli fulvo-albescentes

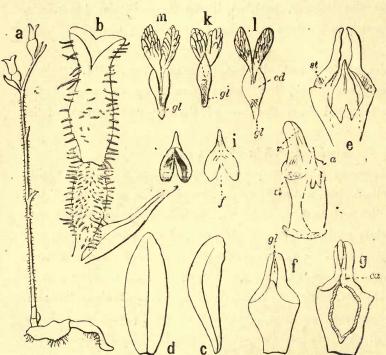


Fig. 57, Arisanorchis Takeoi Hayata; a, the plant; b, a flower; c, a petal; d, a lip; e, a column, seen from front; f, the same, seen from back; g, the same, seen from back, anther and dorsal portion of the clinandrium taken off; h, the same, seen from side; i, an anther, seen from back; j, the same, seen from front; k, pollinarium; l, and m, the same, seen from another side; a=anther; ca=columnal appendage; cd=caudicle; f, filament; gl=gland; r=rostellum; st=stigma; fig. a, natural size; others more or less magnified.

squamati, (squamis tenuissimis vaginiformibus a se 2-3 cm. remotis hyalinis circ. 1 cm. longis cylindricis, ore late obliquis apice acutis), tenuiter pilosi, pilis tenuissimis patentibus crispartibus pis, floriferis 2 cm. longis, floribus generaliter 2-3 a se 1cm. remotis subsecundis, pedicellis (exceptis ovariis) 3 mm. longis, bracteis sub pedicello lanceolatis semi-

hyalinis 6–7 mm. longis. Flores subalbi vel pallido-flavi, ovariis viridibus toto glanduloso-pilosis, pilis reflexis tenuissimis. Sepala toto connata tubum formantia toto tenuiter pilosa, tubo 6½ mm. longo 2½ mm. in diametro ± declinato basi subito constricto ad orem leviter contracto, ore 2 mm. in diametro, basi anteriore plus minus minute saccato, (sacco obscuro vel ½ mm. producto), apice 3–lobato, lobo postico (sepalo postico) triangulari 2½ mm. longo

totiusque lato apice obtuso, lobis lateralibus postico minus latis conformibus. Petala sublibera oblique oblanceolata 6 mm. longa 1½ mm. lata apice obtusa basi ¼ mm. lata ~ formiter falcata basi gradatim angustata. Labellum elongato-oblongum 6 mm. longum 2 mm. latum subinclusa subrecta suberecta sursum prope apicem desuper recurva apice obtusa basi 1 mm. lata. Columna 2 mm. longa. Clinandrium profunde excavatum; anthera bilocularis erecta apice cuspidato-appendiculata, loculis fusiformibus. Rostellum erectum 2-lobatum, lobis linearibus 1½ mm. longis a glandula lanceolata separatis. Pollinia 2 sectilia (granulis cuneiformibus ¾ mm. longis) fusiformia, medio caudiculae peltatim affixa, caudicula oblanceolata 2½ mm. longa ½ mm. lata apice obtusa basi attenuata flava hyalina; glandula lactacea linearis 1 mm. longa; stigmata lateralia basi utroque latere rostelli sita. Columna antice plana non alata, sed apice antice cum appendiculis simplicibus vel 2-partitis instructa, partibus linearibus secus rostellum productis 1 mm. longis rectis erectis.

Hab. Arisan: inter Karapin et Suisharyō, ad 3300 ped. alt., leg. Takeo Itō, Mart. 28, 1914.

Found on a sundy place, growing in a clumps of Kalanchoe spathulata, apparently with some indirect connections with the latter.

Goodyera R. Br.

Goodyera bilamellata Hayata sp. nov. (Fig. 58). Caulis 15 cm. longus basi foliatus sursum racemosus. Folia oblongo-lanceolata 5 cm. longa 18 mm. lata apice acuta basi subito acuminata attenuata ad petiolum abeuntia chartaceo-membranacea in exsiccato margine subintegra vel minute crispata, petiolis 4 cm. longis basi vaginato-dilatatis caulem complete amplectantibus. Caules sursum hirsuti, partibus floriferis 5 cm. longis, floribus sessilibus a se 5 mm. remotis, bracteis lanceolato-ovatis 1 cm. longis 4 mm. latis apice acuminatis basi cuneato-angustatis extus hirsutis intus glabris 1-nerviis, ovariis 6 mm. longis tortuosis hirsutis. Sepalum posticum ovato-triangulare 9 mm. longum basi latissimum 4 mm. latum apice triangulari-acutum ad summum obtusum margine prope apicem interiore recurvum 1-nervium concavum cum petalis galeam formans extus hirsutum, lateralia oblonga obliqua 1 cm. longa 3½ mm. lata 1-nervia sursum convoluta acuminata ad summum obtusa. Petala

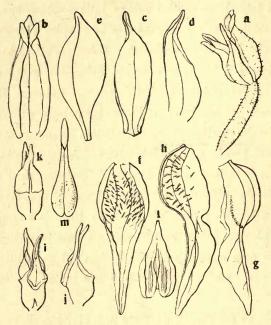


Fig. 58, Goodyera bilamellata HAYATA; a, a flower; b, a cap composed of a dorsal sepal and petals; c, a dorsal sepal; d, a lateral sepal; e, a petal; f, a lip, seen from front; g, the same, seen from side; h, the same, in vertical section; i, a column; j, the same, seen from side; k, the same, seen from back; l, an anther; m, pollinarium.

obovato - spathulata 1 cm. longa 3-4 mm. lata apice breve cuspidata obliqua basi cuneato-attenuata 1-nervia utraque pagine glabra. Labellum oblongum 8-9 mm. longum basi ventricosum, ventriculo extus glabro intus hirsuto, pilis 1 mm. longis, 4 mm. longo 3 mm. lato, sursecus longitudinem plicatum, parte plicata utraque facie glabra 5-nervia explicato ovata 4 mm. longa 3 mm. lata discis 2-lamellatis instructa apice ad marginem recurva subacuta ad summum obtusa. Columna brevis, anthera cordato-ovata apice attenuata 4 mm. longa. Ros-

tellum bipartitum, partibus linearibus rectis 2 mm. longis.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Goodyera caudatilabella Hayata sp. nov. (Fig. 59). Caulis 40–50 cm. longus basi vaginatus medio foliatus sursum racemosus. Folia oblongo-obovata circ. 20 cm. longa 6 cm. lata apice acuta basi attenuata ad petiolum 5 cm. longum abeuntia, venulis transversis manifeste reticulatis, in exsicato membranacea, petiolis 5 cm. longis basi dilatatis vaginiformibus, vaginis 1–2 cm. longis 13 mm. latis. Caulis inter partem racemosam et foliosam squamatus, partibus squamigeris 17 cm. longis hirsutis, squamis triangulari-lanceolatis linearibus 14 mm. longis 2 mm. latis, partibus racemosis 20 cm. longis, floribus inferioribus remotis a se 1 cm. remotis, superioribus densiusculis, bracteis lineari-lanceolatis 1 cm. longis 1–2 mm. latis, pedicellis subnullis,

ovariis 8 mm. longis dense breveque crispato-hirsutis, pilis glandulosis. Sepalum posticum oblongum 6 mm. longum 3 mm. latum apice acutum margine plus minus recurvum cum petalis galeam formans 3-nervium extus glanduloso-hirsutum intus glabrum; sepala lateralia valde concava 6½ mm.

longa 3 mm. lata extus hirsuta intus glabra. Petala spathulata 6 mm. longa 2 mm. lata ± obliqua apice triangulari-obtusa medio deorsum $\frac{2}{3}$ mm. lata attenuata utraque glabra. Labellum valde concavum late rotundatum 5 mm. longum apice longe caudatum, caudis linearibus $1\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis apice desuper recurvis vel convolutis, extus glabrum intus breve glandulosohirsutum. Columna 3 mm. longa apice 1 mm. lata basi angustior. Rostellum triangulare 1 mm. longum $1\frac{1}{2}$ mm. latum; anthera oblongo-triangularis $1\frac{2}{3}$ mm. longa $1\frac{1}{3}$ mm. lata.

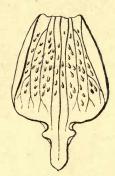


Fig. 39, Goodyera caudatilabella HAYATA.

HAB. Ins. Okinawa, leg. Y. TASHIRO, 1887, Mart. fl.

Near G. procera; but differs from it by the short rostellum and long caudate lips.

Goodyera cyrtoglossa Hayata sp. nov. (Fig. 60) Caulis 80–100 cm. longus inferiore 7 mm. latus deorsum vaginatus medio foliatus sursum racemosus, partibus foliatis 20 cm. longis. Folia oblonga vel oblongo-lanceolata 15 cm. longa 5 cm. lata apice acuminata basi acuminata ad petiolum abeuntia in exsiccato submembranacea, petiolis 7–8 cm. longis basi dilatatis vaginatis, vaginis 1–2 cm. longis 13 mm. latis, partibus inter partem floriferam et racemosam squamiferis, squamis lanceolatis 3 cm. longis 1 cm. latis caulem amplectantibus, partibus floriferis 15 cm. longis, rhachibus dense breveque pilosis, bracteis lanceolatis 1 cm. longis 2 mm. latis apice lineari-acuminatis, pedicellis subnullis, ovariis 1 cm. longis dense breveque pilosis, pilis brevibus crispatis. Sepalum posticum ovato-lanceolatum 7 mm. longum 2½ mm. latum extus breve hirsutum intus glabrum subtrinervium, nervis lateralibus tenuissimis; sepala lateralia quam postico paullo longiora et latiora ± obliqua. Petala spathulato-linearia 9 mm. longa 1 mm. lata apice obtusa vel rotundata medio deorsum attenuata basi ¼ mm. lata. Labellum late rotundatum apice caudatum, parte

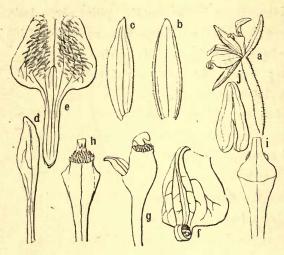


Fig. 60, Goodyera cyrtoglossa HAYATA; a, a flower; b, an uppermost sepal; c, a lateral sepal; d, a petal; e, a lip; f, the same, seen from back; g, a column, seen from side; h, the same, seen from front; i, the same, seen from back, anthers taken off, showing clinandrium; j, an anther, seen from front.

rotundata valde concava 3 mm. longa 3½ mm. lata, parte caudata lineari 2½ mm. longa ½ mm. lata apice interiore desuper convoluta. Columna 4 mm. longa ½ mm. lata apice dilatata 1½ mm. lata; rostellum triangulare 1½ mm. longum 1 mm. latum apice 2-aristato-lobatum; anthera ovato-oblonga 2 mm. longa 1 mm. lata.

Hab. Kappanzan, leg. U. Mori et Y. Shimada, Mart. 1910, (fl.).

Near G. procera, but differs by the long curled tails

at the apex of the lips, and by much smaller flowers.

Goodyera longibracteata Hayata sp. nov. (Fig 61, a-h). Caulis 50 cm. longus basi vaginatus deorsum infra medium foliatus. Folia oblique ovato-oblonga vel obovato-oblonga 12 cm. longa 5½ mm. lata apice breve acuminata ad summum breve aristata basi subito attenuata ad petiolum abeuntia, petiolis (cum vaginis) 6 cm. longis subplicatis basi dilatatis ad vaginam (partem dilatatam) abeuntibus, vaginis 3 cm. longis 8 mm. latis nervosis; caulis partes foliosæ 10 cm. longæ; partes floriferæ 14 cm. longæ; partes inter partem floriferam et foliatam 18 cm. longæ squamatæ, squamis 3 cm. longis lineari-lanceolatis caulem amplectantibus. Racemi laxe vel denseque floriferi, bracteis lineari-lanceolatis 15 mm. longis 3 mm. latis apice acuminatis florem superantibus, rhachibus et ovariis brevissime puberulis, ovariis (pseudopedicellis) 8 mm. longis linearibus. Sepalum posticum elongato-oblongum 7½ mm. longum 2½ mm. latum apice obtusum basi leviter contractum 1½ mm. latum margine sursum apiceque interiore recurvum 3-nervium dorso breve hirsutum facie glabrum, lateralia cum postico æquiformia sed ± obliqua latiora 3 mm. lata. Petala spathulato-linearia 7 mm.

longa $1\frac{1}{2}$ mm. lata apice obtusa medio deorsum cuneato-attenuata basi $\frac{1}{5}$ mm. lata 1-nervia. Labellum cuspidato-rotundatum 6 mm. longum explicato

5½ mm. latum apice caudatum, (cauda lineari - oblonga 2 mm. longa 14 mm. lata apice obtusa basi contracta plana antice recurva), sub cauda usque ad basin ventricosum, ventriculo 4 mm. longo 21 mm. lato extus glabro intus piloso (pilis 3 mm. longis) crasso ad marginem membranaceo. Columna (exceptis antheris et rostellis) 3 mm. longa; rostellum profunde 2lobum, lobis linearitriangularibus 2 mm. longis & mm. latis:

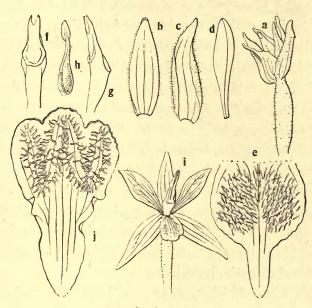


Fig. 61, Goodyera longibracteata Hayata; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip, expanded; f, a column, seen from front; g, the same, seen from side; h, pollinarium; i-j, Goodyera longirostrata Hayata; i, a flower, sepals and petals, expanded; j, a lip, expanded.

anthera triangulari-lanceolata 3 mm. longa 1½ mm. lata apice acuminata.

Hab. Kusukusu, leg. Y. Tashiro, 1913, Jan. fl.

Very near G. cyrtoglossa Hayata; but differs from it by the shorter tail at the apex of the lips and erect rostellum. In G. cyrtoglossa Hayata, the rostellum is always curved forwards at the apex. Also near G. foliosa Benth. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. VIII. t, 374), but differs from it by the much narrower lanceolate petals.

Goodyera longirostrata Hayata sp. nov. (Fig. 61, i–j). Caulis basi repens ad nodos radicans, radicibus semper solitariis, internodiis 2–3 cm. longis ad nodos reliquis foliorum instructis, a basi sursum erectus 20 cm.

altus, basi foliatus sursum racemosus. Folia ovato-oblonga 6½ cm. longa 3 cm. lata apice acuta basi rotundata subito ad petiolum abeuntia margine integra in exsiccato membranacea, petiolis 4 cm. longis basi dilatatis vaginiformibus caulem complete amplectantibus, partibus dilatatis 2 cm. longis. Racemi pauciflorati, rhachibus dense molleque hirsutis, bracteis angustatooblongis 3-nerviis 2 cm. longis 6 mm. latis apice acuminatis margine ciliolatis, floribus sessilibus, ovariis 1½ cm. longis. Sepala subæqualia angustato-oblonga 11 cm. longa 6 mm. lata apice acuta 3-nervia utraque facie glabra, posticum cum petalis galeam formans. Petala cuneato-oblanceolata 14 cm. longa 6 mm. lata apice triangulari-acuta basi cuneato-attenuata ± obliqua 1-nervia, venis lateralibus obscuris. Labellum basi ± saccatum explicato ovatum 1½ cm. longum 8 mm. latum apice late cuspidato-acutum, sacco intus dense piloso, (pilis longiusculis plus 1 mm. longis apice glanduliferis), multinervium. Columna brevis 2 mm. longa. Rostellum lineare 7 mm. longum 2-partitum, partibus linearibus 6 mm. longis 1 mm. latis apice acuminatis. Pollinia cuneato-linearia 9 mm. longa.

Hab. Akōchō: Buisan, ad 7000 ped. alt., leg. S. Sasaki.

Goodyera morrisonicola HAYATA (Tab. XVII.) Mater. Fl. Formos. p. 343. Caulis basi inferne radicans superne ascendens 10 cm. longus, tota longitudine foliatus. Folia alterna petiolata ovata vel ovato-oblonga 3 cm. longa 1½ cm. lata apice acuta basi rotundata margine minute crispata 3-5 nervia, petiolis 1½ cm. longis a medio deorsum dilatatis caulem amplectantibus. Scapi terminales 4 cm. longi laxe florati pubescentes, bracteis lanceolatis acuminatis 1 cm. longis basi 4 mm. latis florem subamplectantibus. Sepala subæqualia libera, posticum erectum concavum oblongo-angustatum 1 cm. longum 31 mm. latum apice obtusum cum petalis angustis in galeam connivens, lateralia libera erecta. Petala oblonga 11 mm. longa 3 mm. lata apice obtusa basi Labellum ad basin columnæ sessile plicato-incurvo-ascendens 8 mm. in longitudine basi subsaccatum, (sacco intus villoso apice recurvoobtuso), margine integrum, apice dentibus lateralibus brevibus. Columna brevis 1 mm. longa apice longe 2-cornuta, cornibus 3½ mm. longis. Anthera erecta ovato-lanceolata 33 mm. longa apice attenuata acuminata. Capsula recta oblonga erostrata 1 cm. longa 4 mm. lata.

Hab. In monte Morrison, ad 6500 ped. alt., leg. T. KAWAKAMI et U. Mori, Oct. 1906, (No. 2323).

Near G. Henryi Rolfe, but the leaves of the present plant are narrower, acuter, and the bracts are more acuminate.

Goodyera pachyglossa Hayata sp. nov. Caulis 25 cm. longus basi 3-4 cm. in diametro deorsum glaber sursum breve hirsutus tota longitudine foliatus. Folia alterna 3 cm. a se remota oblique ovato-oblonga 5 cm. longa 2 cm. lata apice obtusa ad summum minute obscureque mucronata basi rotundata subito ad petiolum abeuntia margine subintegra vel obscure minuteque crispata, petiolis 2 cm. longis basi dilatatis vaginiformibus, partibus vaginiformibus 1 cm. longis. Racemi (vel partes floriferæ caulis) 5 cm. longi dense floriferi, rhachibus breve hirsutis, bracteis lanceolatis 12 mm. longis 3 mm. latis glabris, ovariis 9-10 mm. longis hirsutis 3-nerviis. Sepalum posticum valde concavum ovato-oblongum 8 mm. longum 3-4 mm. latum apice obtusum basi ± contractum 1½ mm. latum 3-nervium extus ± hirsutum intus glabrum, lateralia oblique ovata 8 mm. longa 4 mm. lata apice obtusa 3-nervia extus hirsuta intus glabra. Petala rhomboideo-obovato-cuneata 8½ mm. longa 3½ mm. lata apice triangulari-obtusa basi cuneato-attenuata 1-nervia margine sursum subundulatocrispata. Labellum ovatum 7 mm. longum basi ventricosum, ventriculo 3 mm. longo totiusque lato extus glabro intus dense hirsuto, pilis complanatis 1mm. longis, valde crassum ad margine tenuissimum membranaceum. Columna 1 mm. longa. Rostellum 2-partitum, partibus linearibus 3 mm. longis. Anthera elongato-ovata 3 mm. lata.

Hab. Rinkiho, 5000 ped. alt., leg. H. Inaba, 1911, Aug. (fl. rosacei).

Near G. morrisonicola Hav., but differs from it by the much thicker lips, larger leaves, and by the longer stems.

Cryptostylis R. Br.

Cryptostylis erythroglossa Hayata sp. nov. (Tab. XVIII.) Radices incrassatæ. Folia 2 crassiuscula in exsiccato membranacea elliptico-ovata vel elliptica 10 cm. longa 5 cm. lata apice obtusa basi obtuso-contracta subtus pallidiuscula, petiolis 3 cm. longis subplicatis. Scapi 7 cm. longi, floribus racemosim dispositis, bracteis lanceolatis 7–10 mm. longis acuminatis. Sepala acqualia linearia 13 mm. longa 2 mm. lata margine interiore plicata viridia

apice acuminata. Petala viridia linearia 9 mm. longa 1 mm. lata margine conduplicatim vel singulariter plicata apice acuminata patentia. Labellum superius oblongo-ovatum vel lanceolato-ovatum 13 mm. longum 5 mm. latum rubrum apice acuminatum basi rotundatum basi breve saccatum, (sacco ore triangulari 2 mm. longo $1\frac{1}{2}$ mm. lato) multinervium supra minute denseque puberulum. Columna brevissima 1 mm. longa; appendiculæ elinandrii (staminodia) 2 pulviniformes.

HAB. Formosa: loco non indicato, cult. in seminario Taihoku, leg. B. HAYATA, Jan., 1912.

Near Cryp. filiformis (Blume Fl. Jav. Orchid. Vol. I. t. 45, fig. 3).

Nervilia Gaud.

Nervilia purpurea (Hayata) (Tab. XIX.) Mater. Fl. Formos. p. 345. Herba terrestris; caulis foliatus brevissimus bulbosus, scapis floriferis aphyllis vaginatis. Folia cordata 5 cm. longa 6 cm. lata apice rotundata brevissime apiculata basi cordata ad sinus acuta margine integra supra breve setulosa subtus glabra, petiolis 2½ cm. longis. Scapi aphylli inferiore vaginati, (vaginis 3 cm. longis apice rotundatis summum brevissime apiculatis), sursum 2–3 florati, bracteis oblanceolatis 1½ cm. longis 2 mm. latis. Sepala æqualia libera erecta spathulata 15 mm. longa 3 mm. lata apice breve acuta basi attenuata. Petala sepalis angustiora lineari-oblanceolata 14 mm. longa 2½mm. lata apice breve acuta basi attenuata erecta. Labellum basi columnæ situm rectum liberum erectum obovatum obscure 3–lobatum 12 mm. longum 10 mm. latum apice rotundatum. Columna elongata 7 mm. longa apice clavata erecta.

Hab. Köshün: leg. T. Kawakami, Juli. 1906, (No. 5150).

Near *Pogonia plicata* LINDL., but differs from it by the broader oblanceolate sepals and much narrower linear bracts.

Nervilia yæyamensis Hayata (Fig. 62) Ic. Pl. Formos. II. p. 140. Scapi aphylli 40–50 cm. longi inferiore ad nodos vaginati, internodiis 10 cm. longis, vaginis 3 cm. longis ore obliquis, laminis obtusis, medio squamis singulis instructi, squamis amplexicaulibus elongatis 3 cm. longis acutis, partibus floriferis 10–15 cm. longis, bracteis lanceolatis, pedicellis (cum ovariis) 6–7mm. longis, floribus horizontaliter patentibus vel nutantibus. Flores semipatentes, 23 mm. longi. Sepala subæqualia linearia, posticum 17 mm. longum 2½ mm.

latum apice acutum basi leviter attenuatum non contractum 3-nervium, lateralia vix latiora quam iis posticis 17 mm. longa 3 mm. lata 3-nervia apice acuta basi attenuata non contracta. Petala linearia 16 mm. longa 2 mm. lata apice acuta

basi attenuata non contracta. Labellum ovatum 17mm. longum 10 mm. latum apice 3lobatum, lobis lateralibus acutis brevibus, lobo medio latiore ovato 6mm. longo 5 mm. lato apice obtuso basi non contracto, basi trinervium, venulis lateralibus obliquis plurimis, supra barbato-

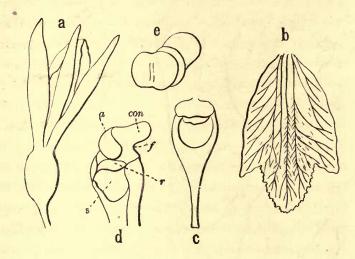


Fig. 62, Nervilia yæyamensis Hayata; a. a flower; b. a lip; c. a column, seen from front; d. the same, seen from side; e. anther; r=rostellum, s=stigma, c=clinandrium, a=anther, con =connective, f=filament.

hirsutum. Columna semiteres 6 mm. longa apice plus minus clavata exalata. Pollinia 2 granulosa. Ovarium obovoideum 3½ mm. longum apice truncatum basi distincte constrictum prominente 2-costatum inter costas 1-costulatum.

HAB. Yæyama; Ishigakishima, Juli., 1910.

Near *Pogonia Scottii* Reichb. f. in Ann. Roy. Bot. Gard. Calc. VIII. t. 360; but differs by the barbate lips with obtusely contracted base.

Didymoplexis GRIFF.

Didymoplexis subcampanulata Hayata (Fig. 63) Ic. Pl. Formos. II. p. 136. Herba tenuis aphylla, rhizomatibus tuberiferis, tuberibus fusiformibus 1½ cm. longis 6–7 mm. latis moniliforme 2–3 continuis. Scapi erecti 5–6 cm. longi teretes inferiore 1–2–nodosi, ad nodos squamis unis instructi, squamis fissis vel integris 4 mm. longis triangularibus, partibus floriferis 2½ cm. longis, superiore sub floribus singulis 1–bracteatis, bracteis late triangularibus apice obtusis basi latissimis 2½ mm. longis 3 mm. latis. Flores spicati inferiore

3 mm. a se remoti superiore plus dense dispositi subcampanulatim patentes 1 cm. longi 5 mm. lati, pedicellis cum ovariis 12 mm. longis. Sepala: posticum elongato-oblongum 1 cm. longum 4 mm. latum apice rotundatum, inferiore cum

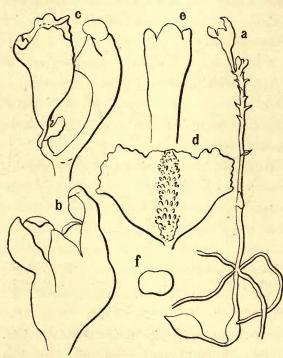


Fig. 63, Didymoplexis subcampanulata HAYATA; a, the plant; b, a flower, seen from side; c, the same, sepals and petals taken off; d, lamina of the lip; e, apical portion of a column; f, pollinia, very soft; fig. a, natural size.

petalis connatum, lateralia postico æquilonga se latere interiore a basi usque ad medio connata superiore libera apice rotundata. Petala cum sepalo postico subsimilia sed breviora. Labellum late cuneato-triangulare 5 mm. longum ad apicem truncatum 6 mm. latum apice erosam basi breve unguiculatum, unguibus 1 mm. longis, apice unguium 1-appendiculatum, appendiculis lamellatis erectis latissimis, medio 3seriatim cristato-tuberculatum, tuberculis lamelli - formibus. Columna 5 mm. longa apice alata basi exalata. Capsula oblonga utrinque contracta 17 mm. longa 8 mm. lata valvatim dehiscens, valvis ad

utraque extremitatem unitis 3 latioribus 3 angustioribus, extus parce minute tuberculata. Semina minutissima filiformi-linearia 14 mm. longa.

HAB. Köshün, leg. T. KAWAKAMI, Mart., 1910, et B. HAYATA Aug., 1912.

Near *D. pallens* Griff., but differs from it by nearly campanulate flowers with obtriangular lips. *D. pallens* Griff. figured in Ann. Roy. Bot. Gard. Calc. V. t. 346 has rather tubular flowers with cuneate oblong lips. The description of capsules above given is drawn up from another specimen which was doubtingly referred to *D. pallens* by myself in my Materials for a Flora

of Formosa p. 347. The type specimen, with several duplicates, was first collected by Mr. T. KAWAKAMI at Köshün. The plant was also found by myself in my excursion to the island in the beginning of July, 1912, on the sandy ground in a clump of shrubs near the sea-shore on the eastern coast of the south cape.

Galera Blume.

Galera kusukusensis Hayata sp. nov. (Tab. XX.) Terrestris aphylla lacticolor tuberifera. Tuber oblongo-ovoideum horizontaliter situm vel ascendens 1-2 cm. longum 8 mm. in diametro subnudum apice scapum singulum gerens. Scapi circ. 30 cm. longi basi squamis verticillatis instructi a basi sursum squamis remotis alternis instructi, squamis ovatis 1 cm. longis basi semiamplexicaulibus apice acutis, partibus floriferis 10 cm. longis, floribus 1-2½cm. a se remotis, bracteis linearibus vel lanceolatis circ. 1 cm. longis, pedicellis 5 mm. longis subnutantibus, ovariis globosis 5 mm. in diametro. Sepala et petala semiclausa non patentia. Sepala subæqualia linearia 10 mm. longa 1 mm. lata apice acuminata basi non contracta. Petala lanceolata 10 mm. longa quam sepalis latiora 1½ mm. lata apice acuminata basi non contracta. Labellum valde concavum erectum oblongum 10 mm. longum in explicato 8 mm. latum apice triangulari-obtusum margine undulato-crispatum supra purpureo-maculatum, maculis 4, sursum muricato-tuberculatum basi ad calcar 3½ mm. longum productum. Columna brevissima. Epipogon kusukusense HAYATA in sched. herb. Taihoku.

HAB. Kusukusu, leg. B. HAYATA et S. SASAKI, 1912, Juli.

Near Galera Rolfei HAYATA (=Epipogon Rolfei HAY.); but differs from it by the longer lips which are undulately crispate at the margin, and by the much narrower petals.

Galera Rolfei Hayata (Fig. 64) Mater. Fl. Formos. p. 348. Tuber solitarium 3 cm. longum 12 mm. latum elongato-ellipticum apice obtusum carnosum horizontaliter situm. Scapus circ. 35 cm. longus incrassatus erectus rectus basi ascendens teres brunneus inferne squamis distantibus amplexicaulibus obtusis tenuissimis membranaceis instructus, superne florifer, bracteis alternis erecto-patentibus lineari-lanceolatis acuminatis membranaceis circ. 1 cm. longis uni-florem amplectantibus. Flores in pedicellis filiformibus cernui aut tandem

penduli scapo concolores. Sepala æquiformia angustata erecta 7 mm. longa 1 mm. lata obtuso-acuminata integra parcissime punctata, lateralibus plus minus obliquis. Petala sepalo latiora 7 mm. longa 2 mm. lata acuminata. Labellum sessile concavum gynostemium amplectans, ima in calcar breve obtusum 3 mm.

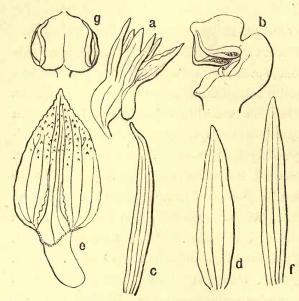


Fig. 64, Galera Rolfei Hayata; a, a flower; b, a dorsal sepal; c, a lateral sepal; d, a petal; e, a lip; b, a column; g, an anther.

longum rectum productum, limbo ovato obtuso 9 mm. longo erecto ad marginem subintegro vel sub lente minutissime eroso intus papilloso infra apicem parcissime papilloso. Gynostemium brevissimum crassum obtusissimum 2 mm. longum dorso rotundato - convexum. Ovarium obovoideum sulcatum, pedicello 4 mm. longo.

Epipogon Rolfei HAYATA in sched. herb. Tökyö.

Hab. Okinawa, leg. S. Tanaka, 1891, Mai. (No. 147).

The present plant is near *G. nutans*, but differs from it in having shorter spurs, and in the lips which are nearly obtuse at the apex, nearly entire on the margin, and very much less papillose on the upper surface.

Platanthera RICH.

Platanthera longibracteata Hayata sp. nov. Caulis 30–40 cm. longus basi vaginatus, (vaginis 4 cm. longis apice obtusis), infra medium 1–2–3–foliatus medio squamatus, partibus squamatis 10 cm. longis, sursum florifer, partibus floriferis 10 cm. longis. Folia spathulata vel ovato-oblanceolata apice obtusa 16 cm. longa 3 cm. lata apice obtusa deorsum gradatim angustata ad vaginam 1½ cm. longam abeuntia exsiccato membranacea. Racemi laxe florati glabri, floribus a se 1 cm. remotis, bracteis lanceolatis 1½ cm. longis acuminatis, floribus sessilibus, ovariis vel fructibus 6–7 mm. longis ellipsoideis apice rostratis

3 mm. latis. Sepalum posticum triangulari-oblongum 2½ mm. longum 1½ mm. latum apice obtusum basi ± dilatatum 3-nervium, lateralia oblonga v-formiter recurva 4 mm. longa 1½ mm. lata apice obtusa basi angustata 1 mm. lata 3-nervia. Petala triangulari-oblonga 3 mm. longa 1 mm. lata 1-nervia apice acuta basi haud contracta. Labellum lineare 6 mm. longum ½ mm. latum apice obtusum facie longitudinaliter rugosum basi calcaratum, calcari lineari 1 cm. longo ½ mm. lato utraque extremitate angustato apice obtuso. Columna brevissima.

HAB. Mt. Morrison, ad 8500 ped. alt., leg. S. SASAKI.

Platanthera pachyglossa Hayata sp. nov. (Tab. XXI.) Caulis 30 cm. longus erectus glaber angulosus basi vaginatus deorsum foliatus sursum racemosus. Folia ovato-oblonga vel oblongo-lanceolata 6 cm. longa 1½ cm. lata apice acuta ad summum obtusa basi obtusa ad basin plus minus decurrentia caulem semi-amplectantia. Racemi 10 cm. longi, floribus a se 1–2 cm. remotis, bracteis florem vix superantibus lanceolatis, pedicellis circ. 0 vel brevissimis, ovariis circ. 1 cm. longis linearibus. Sepalum posticum rotundatum vel ovato-rotundatum 5 mm. longum 4½ mm. latum apice obtusum basi leviter truncato-cordato-contractum ad insertionem 2 mm. latum, lateralia lineari-lanceolata 7 mm. longa 2–2½ mm. lata ~ -formiter recurva margine extime recurva apice acuto-obtusa basi non contracta. Petala valde oblique late rotundata longe cuspidata cum cuspidibus 5 mm. longa 4 mm. lata, cuspidibus linearibus 3 mm. longis apice obtusis 1 mm. latis. Labellum lineari-lanceolatum crassiusculum rectum 9 mm. longum 2 mm. latum. Columna lata brevis.

HAB. Formosa: loco non indicato.

Platanthera stenoglossa Hayata sp. nov. Caulis 40 cm. longus infra medium 1-foliatus medio sursum squamatus, squamis ovato-lanceolatis lanceolatis vel lineari-lanceolatis 1-3 cm. longis. Pars caulis florifera 10 cm. longa glabra, bracteis acuminato-ovatis vel ovato-lanceolatis 15-13 mm. longis 3½ mm. latis 3-nerviis. Sepalum posticum oblongum 4½ mm. longum 2 mm. latum apice obtusum basi contractum 1-nervium, lateralia linearia postico angustiora 6 mm. longa ~-formiter recurva ½ mm. lata 1-nervia apice obtusa. Petala obliqua cuspidato-ovata 4½ mm. longa 2½ mm. lata apice obtusa basi valde oblique rotundata. Labellum lineare angustatum 5 mm. longum ¾ mm.

latum apice obtusum crassiusculum basi calcaratum, calcari lineari 6 mm. longo 1-\frac{2}{3} mm. lato antice leviter recurvo. Columna (cum anthera) 3 mm. longa totiusque lata.

Hab. Shichiseitonzan, leg. T. Kawakami et Y. Shimada Juli, 1910. Remarkable for having narrower lateral sepals than the dorsal one.

Platanthera truncatolabellata HAYATA sp. nov. (Fig. 65). Caulis erectus gracilis minute brevissime hirtellatus 35 cm. longus ad totam

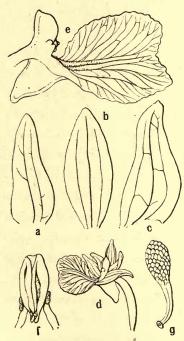


Fig. 63, Platanthera trancatolabellata HAYATA; d, a flower; b, a dorsal sepal; c, a lateral sepal; a, a petal; e, a lip; f, columna; g, a pollinarium.

longitudinem foliatus superne florifer. Folia alterna sessilia oblonga 3 cm. longa 12 mm. lata apice rotundato-acuta basi in vaginam brevem contracta amplexicaulia, vaginis Flores ad axillas foliorum 3 mm. longis. superiorum solitarii vel racemosi, racemis 10 cm. longis. Flores mediocres 11 cm. in diametro. Sepala inæqualia erecto-patentia, posticum oblongo-angustatum 8½ mm. longum 2¾ mm. latum apice rotundato-acutum, lateralia latiora ovata 8 mm. longa 3 mm. lata apice attenuato-obtusa basi rotundata valde obliqua latere labelli connata. Petala ovatooblonga 7 mm. longa 2 mm. lata basi obliqua ad basin columnæ connata apice attenuatoobliqua. Labellum 13 mm. longum unguiculatum, unguis basi columnæ connatus in calcar productus, calcari latissimo 5 mm. longo, ore 4 mm. in diametro, lamina obovato-rotundata 1 cm. longa 8 mm. lata apice emarginata mar-

gine crispata prope medium parce 3-lamellata, lamellis brevissime hirtellatis. Columna 2 mm. longa.

Platanthera obcordata HAYATA (non LINDL.) in Materials for a Flora of Formosa p. 351.

HAB. Nantō: Randaizan, leg. T. KAWAKAMI et U. Mori, Juli. 1907, (No. 3482).

Near P. obcordata (Orch. Western Himalayas in Ann. Roy. Bot. Gard. Calc. IX. p. 144); but differs from it by the quite truncate or emarginate lips.

Platanthera sp. (Fig. 66.) Terrestris; Tuber suberectum cylindricum 1 cm. longum. Caulis 20 cm. longus gracilis erectus deorsum supra basin 2–3–foliatus sursum racemosus, partibus inter floriferas et foliatas 8 cm. longis remote

squamatis, squamis 5 mm. longis linearibus. Folia oblonga vel ovato-oblonga 3½ cm. longa 1 cm. lata apice obtusa vel acuta ad summum breve aristata vel obtusa basi caulem amplectantia ad vaginam 5 mm. longam abeuntia. Racemi (partes floriferæ) 8 cm. longa glabra, floribus a se 5-10 mm. remotis, bracteis ovatolanceolatis 5 mm. longis 14 mm. latis glabris. Sepalum posticum ovato - oblongum 3 mm. longum 1½ mm. latum apice truncato-obtusum basi leviter contractum 3 mm. latum 1-nervium margine interiore leviter recurvum, lateralia postico augustiora 3 mm. longa 1 mm. lata oblique lineari-oblonga apice obtusa basi obliqua non contracta 1-nervia margine interiore recurva. Petala sepalo postico conformia sed Labellum profunde crusiforme 3minora. lobum, lobis basilaribus lineari-filiformibus a lobo terminali angulo 90° divaricatis 4 mm. longis 10 mm. latis recurvis, lobo terminali lineari 2 mm. longo 1-1 mm. lato apice obtuso recto, basi calcaratum, calcari spathulato-

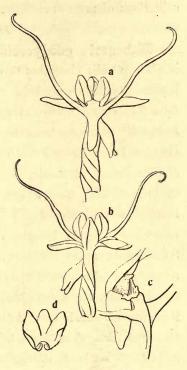


Fig. 66, Platanthera sp.; a, a flower; b, the same, seen from back; c, central part of the same; d, a columna, with a dorsal sepal and petals.

lineari 4 mm. longo sursum dilatato $\frac{2}{3}$ mm. lato apice obtuso basi angustato subrecto. Columna brevissima; anthera $\frac{2}{3}$ mm. lata.

Hab. Kappanzan, leg. W. R. Price, Juli. 1912.

This interesting tiny orchid was collected by Mr. W. R. PRICE in July, 1912, in an open country among dense *Miscanthus* in Mt. Kappanzan. It is somewhat near *Habenaria aristata* HOOK. f. (in Orchids of the Sikkim Himalayas

126 ORCHIDEÆ.

in Ann. Roy. Bot. Gard. VIII. t. 409), but differs from it in having much smaller form and very much more divaricate filiformed basal lobes of the lips. I should propose to call this orchid *Platanthera Pricei*, if it proves to be new species of the named genus, or I should rather entirely leave it to Mr. PRICE to name this orchid, as this is one of Mr. PRICE's collections. It lacks in the collections of my own.

Habenaria WILLD.

Habenaria goodveroides Don var. formosana HAYATA n. v. (Tab. XXII.) Caulis elongatus 60 cm. longus glaber, partibus inferioribus aphyllis, intermediis foliis congestis, superioribus aphyllis floriferis, partibus aphyllis infra folia congesta 25 cm. longis vaginatis, vaginis 5 cm. longis remote sitis ore leviter dilatatis apice truncatis, partibus foliatis 7 mm. longis 5-6-foliatis. Folia oblonga 13 cm. longa 5 cm. lata apice obtusa acuta basi contracta in vaginam amplexicaulem attenuata, vaginis 2½ cm. longis, squamis superne minoribus ovato-lanceolatis 2 cm. longis. Spicæ elongatæ 15 cm. longæ dense floratæ, bracteis ovato-lanceolatis 13 mm. longis apice aristato-acuminatis, floribus minoribus. Sepala inæqualia subpatentia, posticum ovatum 4½ mm. longum 3 mm. latum apice obtusum, lateralia angustiora basi obliqua cum petalis adnata apice dorso breve apiculata. Petala sepalo latiora late oblonga 41mm. longa 2½ mm. lata apice obtusa basi valde oblique labello connata. Labellum liguliforme 5 mm. longum 4 mm. latum apice dilatatum 3-lobatum, (lobo medio latissimo triangulari 3 mm. longo totiusque lato apice obtuso, lobis lateralibus angustioribus), basi calcaratum, calcari 2 mm. longo ore contracto 1½ mm. lato; discus basi 2-lamellatus, a medio sursum 1-lamellatus; staminodia 2 mm. longa angustata.

Platanthera goodyeroides var. formosana Hayata=Habenari goodyeroides Hayata (non Don.) Mater. Fl. Formos. p. 353.

Differs from the type by the narrower leaves and lamellate discs.

Habenaria linearipetala Hayata sp. nov. (Tab. XXIII.) Caulis circ. 50 cm. longus deorsum vaginatus, medio approximatim foliatus sursum racemosus. Folia medio caulis approximatim sita obovato-oblanceolata 18 cm. longa 4 cm. lata apice acuminata basi attenuata basi vaginata, vaginis 2 cm. olngis caulem amplectantibus, in exsiccato membranacea. Racemi 10 cm. longi

ORCHIDEÆ. 127

dense floriferi, bracteis lanceolatis $1\frac{1}{2}$ cm. longis apice acuminatis basi attenuatis, pedicellis fere 0, ovariis linearibus vel ovatis circ. 1 cm. longis. Sepalum posticum ovato-lanceolatum circ. 1 cm. longum apice filiforme acuminatum medio $2\frac{1}{2}$ mm. latum basi leviter contractum concavum 3-nervium, lateralia postico conformia vix latiora 3 mm. lata plus minus obliqua. Petala linearia 9 mm. longa $\frac{1}{3}$ mm. lata apice acuminata basi dilatata. Labellum 3-partitum, parte centrali lineari longissima circ. 10 mm. longa $\frac{1}{2}$ mm. lata, partibus lateralibus linearibus centrali brevioribus 5 mm. longis angustissimis $\frac{1}{6}$ mm. latis apice acuminatis, basi calcaratum, calcari 13 mm. longo 1 mm. lato lineari antice leviter recurvo. Anthera $1\frac{1}{2}$ mm. longa erecta 2-brachiata, brachiis divaricatis, staminodiis claviformibus $\frac{1}{2}$ mm. longis. Rostellum λ -forme 2-brachiatum, brachiis divaricatis $1\frac{1}{2}$ mm. longis apice se approximatis descendentibus; stigma 2-partitum, partibus distincte separatis linearibus complanato-teretibus $1\frac{1}{2}$ mm. longis.

HAB. Mt. Morrison, ad 8500 ped. alt. leg. S. SASAKI, 1909, Oct.

Near Habenari astenopetala Lindl. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. Calc. VIII. t. 404), in having linear petals and linear 3-lobed lips; but differs from it by the long tailed sepals and much narrowly based leaves.

Habenaria longitentaculata Hayata sp. nov. (Tab. XXIV.) Caulis erectus 55 cm. longus basi 8 mm. in diametro glaber inferiore vaginatus, vaginis cylindricis 3 cm. longis 8 mm. latis ore obliquis a se 4½ cm. remotis, medio foliatus, foliis approximatis, sursum squamatus, squamis ovatis a se 3½ cm. remotis 2 cm. longis caulem amplectantibus, sursum florifer, partibus floriferis 10 cm. longis. Folia ad medium caulis approximata alterna oblongo-obovata vel ovata 12 cm. longa 5 cm. lata apice breve cuspidato-acuta basi cuneato-attenuata ad vaginam abeuntia, venis primariis parallelis, secundariis transversis manifeste reticulatis. Racemi 10 cm. longi remote florati, floribus a se 2–3 cm. remotis, bracteis ovatis acuminatis 18 mm. longis 6–7 mm. latis. Perianthia patentia, sepalum posticum galeæforme valde concavum 1 cm. longum 6 mm. latum apice acutum basi contractum 3–nervium; sepala lateralia postico conformia sed valde obliqua. Petala profunde 2–loba vel 2–partita, partibus angulo 180° se divaricatis linearibus 1 cm. longis basi

128 ORCHIDEÆ.

1 mm. latis sursum teretibus. Labellum tripartitum, partibus linearibus, parte centrali 11 mm. longa $\frac{1}{2}$ mm. lata, lateralibus centrali brevioribus 6 mm. longis a centrali angulo 45° divaricatis, basi calcaratum, calcari 12 mm. longo antice recurvo ore 3 mm. in diametro. Rostellum λ -forme 2-brachiatum, brachiis 2 mm. longis. Anthera \triangle -formia 2-brachiata, brachiis divaricatis rostello parallelis; staminodia claviformia; stigmata 2-partita, partibus linearifusiformibus $4\frac{1}{2}$ mm. longis $\frac{1}{2}$ mm. latis paralleliter se remotis.

HAB. Nantōchō, in montibus, leg. U. Mori, 1909.

Near *H. ciliolaris* Kränzl, but differs from it by the quite glabrous scapes and biparted petales, portions of which are divaricated at 180°. Also near *Habenaria stenopetala* Lindl. var. *polytricha* Hook. f. (Orchids of the Sikkim Himalayas in Ann. Roy. Bot. Gard. VIII. t. 404, bis) in having long linear petals attaching at their centres to the apex of the ovary, and long linear 3-lobed lips; but differs altogether from it in the leaves, bracts and not tailed sepals.

Habenaria tohoensis Hayaya sp. nov. (Fig. 67). Caulis 40-50 cm.

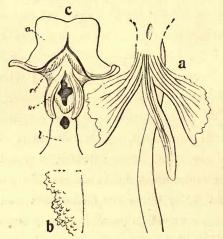


Fig. 67, Habenaria tohoensis HAYATA; a, a lip; b, marginal portion of the same; c, central portion of a flower; a=anther, r=rostellum, s=stigma, l=lip.

longus basi vaginatus supra basin foliatus a medio sursum squamatus, vaginis cylindraceis 6 cm. longis, squamis ovato - lanceolatis 2–3 cm. longis apice acuminatis vel lineariacuminatis, versus apicem flores 2–3–gerens toto glaber. Folia obovato-oblonga vel elliptico-oblonga 11 cm. longa 3 cm. lata apice acuta basi cuneato-angustata ad summum tenuiter aristata. Flores apertientes 2½ cm. in diametro, bracteis linearilanceolatis 2 cm. longis 4 mm. latis 3–nerviis apice lineari-acuminatis,

subsessiles, ovariis 2 cm. longis 3 mm. latis ovato-fusiformi-linearibus apice longe rostratis basi contractis glabris. Sepalum posticum oblongo-ovatum 1 cm. longum 4-5 mm. latum 5-nervium apice obtusum basi \pm contractum, lateralia

Hab. Tōhozan, ad 6500 ped. alt., leg. S. Sasaki, Oct. 1909.

Near H. Miersiana Champ., but differs from it by the not fimbriate lobes of the lip. Also near H. geniculata Don (Orchids of the Sikkim Himalayas, in Ann. Roy. Bot. Gard. Calc. VIII. t. 405), but differs by the much longer central lobes of the lips.

Hemipilia LINDL.

Hemipilia formosana Hayata (Tab. XXV.) Mater. Fl. Formos. p. 354.

Selaginellaceæ.

Selaginella Spring.

Selaginella stenostachya Hayata sp. nov. (Fig. 68) Caulis cum spicis 8 cm. longus glaber pluri-sulcatus pauce remoteque foliosus. Folia a se 1½ mm. remota, dorsalibus minoribus ovatis 1¼ mm. longis ½ mm. latis apice cuspidato-acutis basi leviter contractis margine minute aristato-serrulatis, ventralibus majoribus 1⅓ mm. longis ⅔ mm. latis ovatis apice obtusissimis basi truncato-rotundatis margine minute aristato-serrulatis. Spicæ versus apicem ramorum racemosim dispositæ simplices erectæ rectæ tenuiter tetragonocylindraceæ 7–8 mm. longæ cum bracteis 2 mm. latæ, bracteis radiatis 4–seriatim dispositis imbricatis interdum subpatentibus, dorsalibus ventrali æqualibus rotundato-ovatis 1 mm. longis ⅔ mm. latis apice cuspidato-acutis basi

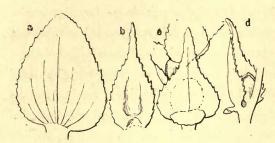


Fig. 68, Selaginella stenostachya HAYATA; a, a ventral leaf; b, a dorsal leaf; c, a portion of a spike; d, a bract seen from side.

rotundatis ad extremitatem auriculis ‡ mm. longis singulis instructis, margine minute setulososerrulatis tenuibus. Selaginella leptophylla HAYATA in MATSUM. et HAYATA Enum. Pl. Formos. p. 553 (non BAKER).

Hab. Shinkōchō, leg. T. Kawakami.

Very near S. leptophylla

Baker, but differs from it by the much narrower spikes.

Lycopodiaceæ.

Lycopodium LINN.

Lycopodium (*Lepidotis*) alpinum Linn. var. transmorrisonense Hayata n. v. (Fig. 69) Caulis repens teres 1½ mm. in diametro sectionis ramosissimus, ramis ascendentibus dense foliosis apice interdum ad stipitem spicarum abeuntibus. Folia imbricatim spiraliter disposita adpressa vel ±

patentia ascendenti-recurva triangularilanceolata 3 mm. longa apice acuminata
basi latissima minus 1 mm. lata crassa
margine integra 1-nervia ± complanata intus plana dorso rotundata in
sectione plano-convexa margine obtusa.
Spicæ cylindricæ 2½ cm. longæ 3-4 mm.
in diametro sectionis, bracteis firme
imbricatis densiuscule spiraliter sitis
sub sporangio singulis caudato-ovatis
apice caudato-acutis basi 1-auriculatis
cum auriculis 4 mm. longis 2½ mm.
latis margine irregulariter denticulatis,

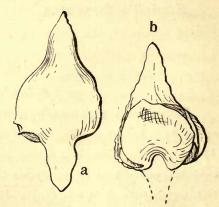


Fig. 69, Lycopodium alpinum var. transmorrisonense HAYATA, a, a bract seen from back; b, the same seen from face.

auriculis oblongo-triangularibus 1 mm. longis minus 1 mm. latis apice obtusis, utraque pagine glabris 1-nerviis, nervis dorso haud intus distincte

visis. Sporaugium reniforme latius quam longius apice late rotundatum basi late sinuatum minus 2 mm. latum. Spicæ simplices ad apicem ramorum solitariæ erectæ longe stipitatæ, stipitibus 3 cm. longis simplicibus erectis rectis subremote foliosis, foliis spiraliter laxiuscule dispositis firme adpressis lineari-lanceolatis 3–4 mm. longis 1½ mm. latis intus concavis extus convexis 1–nerviis utraque glabris margine integris vel irregulariter obscure denticulatis crassiusculis.

HAB. in montibus centralibus, leg. U. Mori, 1908, Dec.

Differs from the type (Hook. Brit. Fer. t. 53) and its variety nikocnse by the long and distinctly peduncled solitary spikes.

Lycopodium carinatum Desv.; Matsum. et Hayata Enum Pl. Formos. p. 554.

HAB. Köshün: Kuraru, leg. S. SASAKI, 1911, Dec.

Lycopodium cunninghamioides Hayata sp. nov. Caulis pendulus dense spiraliter subdistiche foliosus cum foliis 3 cm. latus cum spicis 50 cm. longus. Folia acuminato-linearia vel acuminato-lanceolata 16 mm. longa apice aceroso-acuminata $2\frac{1}{2}$ mm. lata basi leviter angustiora ad insertionem $1\frac{1}{2}$ mm. lata margine integerrima leviter carinata 1-nervia, nervis supra planis versus apicem carinato-elevatis subtus planis, supra viridia subtus pallidiora, foliis dorsalibus basi plus minus tortuosis, ventralibus basi non tortuosis. Caulis versus apicem gradatim ad spicam abeuns, foliis caulinis superioribus gradatim minoribus ad bracteas spicarum abeuntibus. Spicæ 7–8 cm. longæ 17 mm. latæ, bracteis lineari-lanceolatis 11 mm. longis basi latissimis 2 mm. latis apice acuminatis basi rotundatis 1-nerviis margine integris supra basin ad 3 mm. tortuosis, nervis utraque pagine planis non-carinatis. Sporangia cordato-reniformia $1\frac{2}{3}$ mm. lata $1\frac{1}{2}$ mm. longa apice rotundata basi cordata, sinu cordis acuto.

HAB. Urai, leg. T. SōMA, Juni. 1910, (No. 1).

Near L. squarrosum Forst.

Lycopodium formosanum W. HERTER, HAYATA Mater. Fl. Formos. p. 412.

Hab. Taitō: Manchōsha, leg. G. Nakahara, Jan., 1906, (No. 6).

I remember that I saw the type of the species at Kew herbarium. From my memory, I think the present plant here enumerated is identical with the type.

Lycopodium juniperistachyum HAYATA sp. nov. Lycopodium pinifolium HAYATA Mater. Fl. Formos. p. 412 (non Blume) pro parte. Radices basi caulis ramosæ. Caulis pendulus cum spicis 25 cm. longus tota longitudine multisulcatus vel striatus densiuscule foliosus cum foliis 13-15 mm. latus. spiraliter subdistiche subdorsiventraliter disposita lanceolata 11 mm. longa 2 mm. lata apice acuminata basi plus minus angustiora ad basin 11 mm. lata margine integra, (dorsalibus basi tortuosis, ventralibus non tortuosis), utraque glabra crasso-membranacea 1-nervia, nervis supra planis subtus distincte elevatis visis, subtus pagine plus minus pallidiora supra viridia nitida. Spicæ 8-13 cm. longæ terminales simplices vel 1-2-plo dichotome ramosæ cum bracteis 7-8 mm. latæ, bracteis spiraliter radialiter densiuscule dispositis cuspidato-lanceolatis 8 mm. longis apice lineari-acuminatis basi latissimis 13 mm. latis rotundatis ad insertionem plus minus constrictis 3 mm. latis 1-nerviis, nervis intus planis extus (dorso) carinato-elevatis, margine integris basi non tortuosis. Sporangium ad axillas bractearum solitarium cordato-reniforme 1½ mm. latum 1½ mm. longum latius quam longius apice rotundatum basi profunde cordatum, sinu cordis acuto.

Hab. Taitō: Manchōsha, leg. G. Nakahara, Jan., 1906, (No. 787).

Lycopodium taxifolium Науата Mater. Fl. Formos. p. 412 pro parte,
(non Sw.)

Near Lycopodium taxifolium Sw; but differs from it by the linear narrower bracts. This specimen is exactly the same as a specimen from the Philippines which is labelled as Lycopodium pinifolium Blume. Somewhat near L. nitens Sch. (Kunze Farnkräut. I. t. 80), but differs from it by the broader leaves.

Lycopodium pulcherrimum Wall. (Hook. et Grev. Ic. Fil. t. 38).

Hab. monte Morrison, ad 8000 ped. alt., leg. T. KAWAKAMI et U. Mori, Oct., 1907, (No. 1783); Arisan, ad 8000-7000 ped. alt., leg. B. Науата et S. Sasaki, Jan., 1912.

Near L. cryptomerinum Max., but differs from it by the thinner leaves of much softer texture.

Lycopodium Selago LINN.

HAB. in montibus centralibus, ad 11000 ped. alt., leg., U. Mori, 1908, Dec.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō.

Lycopodium serratum Th. var. myriophyllifolium HAYATA n. v. Terrestris; caulis suberectus basi plus minus ascendens tota longitudine densiuscule foliosus teres 1½ mm. in diametro. Folia linearia 12 mm. longa 1½ mm. lata apice acuminata basi haud angustiora margine crispata undulata irregulariter serrulata, serrulis longioribus 1 mm. longis acutis ascendentibus, utraque pagine glabra 1-nervia, nervis supra (intus) elevatis subtus (extus) planis non distinctis. Sporangium ad axillas foliorum solitarium lunulato-reniforme 1¾ mm. longum 1 mm. latum 2-valvatum brevissime stipitatum vel subsessile.

HAB. in monte Arisan, leg. U. Mori, 1908, Mart. (No. 6208).

Differs from the type by the much narrower linear leaves with sharp toothed and crispate margin.

Lycopodium squarrosum Forst in Matsum. et Hayata Enum. Pl. Formos. p. 555.

Hab. Taitō: Botansha, leg. G. Nakahara, Jan. 1906, (No. 789); Biōritsu, leg. S. Nagasawa, Dec., 1906.

Lycopodium subdistichum Makino; Hayata Mater. Fl. Formos. p. 412.

Lycopodium pinifolium Hayata Mater. Fl. Formos. p. 412 pro parte,
(non Blume).

Lycopodium taxifolium Hауата Mater. Fl. Formos. p. 412. pro parte, (non Sw). Hab. Köshün: Botanrosha, Jan., 1906 (No. 791); Wantan, leg. T. Kawakam, 1904; Arisan, leg. B. Науата, Jan., 1912.

Lycopodium tereticaule HAYATA (Fig. 70), Mater. Fl. Formos. p. 411. Descriptio auctata: Epiphyta densissime cæspitosa. Caulis teres filiformis pendulus sursum sorifer, partibus soriferis non distinctis filiformibus in longi-

tudine variabilibus cum bracteis 1½ mm. in diametro sectionis, bracteis spiraliter plus minus imbricatim sitis late cuspidato-rotundatis 1¼ mm. longis 1 mm. latis apice cuspidato-acutis basi leviter contractis crassiusculis intus planis dorso carinatis, (carinis deorsum decurrentibus), margine subintegris. Sporangium

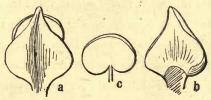


Fig. 70, Lycopodium tereticaule HAYATA; a, a bract, seen from back; b, the same, seen from face, sporangium taken off; c, a sporangium.

ad axillas bracteæ solitarium late cordatum reniforme 1 mm. latum ½ mm. longum apice rotundatum basi cordatum gracillime stipitatum, stipute tenuissimo ½ mm. vel ⅓ mm. longo.

Hab. Arisan, ad 8000 ped. alt., leg. B. Hayaya et Sasaki, 1912, Jan.

Ophioglossaceæ.

Botrychium Sw.

Botrychium leptostachyum Hayata sp. nov. (Fig. 71). Rhizoma? Stipes 14 cm. longus teres basi dilatatus toto glaber. Frons late triangularis

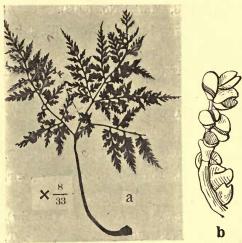


Fig. 71, Botrychyum leytostachyum HAYATA; a, the plant; b, a portion of the spike; $a = \times \frac{a}{3}a$, b, magnified.

16 cm. longa 26 cm. lata digitatotripartita, parte terminali paniculam sporangiorum gerenti, eas
laterales in longitudine æquanti;
partibus lateralibus ovatis plus
minus obliquis cum potiolis 16 cm.
longis 9 cm. latis bipinnatifidis,
(petiolis 2 cm. longis), apice acuminatis basi in ambitu cordatis,
pinnis infimis (latere inferiore)
longissimis 5-6 cm. longis oblique
triangularibus basi 5-6 cm. latis,
pinnulis infimis (latere inferiore)
longissimis 3 ½ cm. longis oblongis

basi 2 cm. longis pinnatifidis, segmentis ovatis apice in ambitu obtusis basi late cuneatis inciso-lobatis, lobis acutis. Textura tenuissima herbacea, venulis terminalibus simplicibus vel furcatis distincte visis tenuissimis, rhachibus frondium subcomplanatis superiore subalatis, rhachibus pinnarum et pinnularum alatis cum alis 2 mm. latis. Pars frondis terminalis iis lateralibus æquilonga longe petiolata, (petiolo 4½ cm. longo medio paniculam sporangiorum gerenti), æqualiter latissime rhomboidea cum petiolo 16 cm. longa totiusque lata bipinnatifida, pinnis infimis triangulari-lanceolatis apice acuminatissimis 10 cm. longis 4 cm. latis, pinnulis infimis sessilibus oblongis 3 cm. longis 1½ cm. latis. Panicula sporangiorum tenuissima e medio petioli partis terminalis

frondis oriunda cum pedunculo 7 cm. longa $1\frac{1}{2}$ cm. lata, (pedunculis $2\frac{1}{2}$ cm. longis) recta, ramis panicularum 8 mm. longis oppositis angulo recto divaricatis sporangia spicatim gerentibus. Sporangia sessilia subglobosa basi latissima 2-valvata toto glabra.

Hab. Nokosan. leg. U. Mori, Jan., 1908, (No. 6291).

Near B. virginianum Sw. (Eat. Fern. North America t. 33), but differs from it by the more loosely arranged lobes of the pinnules, lobes of which are much more larger than those of B. virginianum, and by the much shorter panicles which are on the petioles of the terminal partitions of the fronds.

Osmundaceæ.

Osmunda LINN.

Osmunda regalis Linn. var.?

HAB. Tonkurankei, leg. U. Mori, 1910, Aprili.

No fertile frond. Sterile one is a little different from the type. It may be a variety of the same.

Hymenophyllaceæ.

Trichomanes SM.

Trichomanes acuto-obtusum Hayata sp. nov. (Fig. 72). Rhizoma repens filiforme. Stipes subnullus vel brevissimus vel usque 5 mm. longus. Frons cordato-ovata oblonga vel lanceolata variabillima usque 2 cm. longa usque 1½ cm. lata apice rotundata vel obtusa pinnatifida vel bipinnatifida, pinnis vel pinnulis lobatis, lobis ultimis oblongo-linearibus 2–3 mm. longis

13 mm. latis apice obtusoacutis ad summum acutis, rhachibus frondium 12 mm. latis; frons sursum sorifera; margine plus minus vel haud undulata plus minus desuper recurva, costis utraque pagine

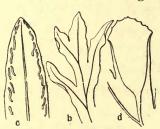




Fig. 72, Trichomanes acuto-obtusum HAYATA; a, the plant; b, a portion of a pinna; c, a portion of the same, showing the vermiform strings; d, a sorus.

elevatis; pagine supra pilis unicellularibus glandulosis brevissimis pauce dispersa subtus subglabrata. Involucrum ad basin pinnarum situm vel ad lobos inferiores pinnarum situm subascendens infundibulo-campanulatum $1\frac{1}{2}$ mm. longum ad orem plus 1 mm. longum apice late rotundatum 2-valvatum, valvis brevibus plus 1 mm. latis minus $\frac{1}{2}$ mm. longis margine erosodenticulatis.

Hab. Bonin, leg. Soma.

Near *T. nanum*, but differs from it by the longer lobes and obtuse receptacles; from *T. filiculum*, differs by the more acute lobes. Also near *T. Kurzii* (BEDD. Fern. Brit. Ind. t. 286), but separable from it by the short obtuse valves of the involucres.

Trichomanes cupressifolium Hayata sp. nov. (Fig. 73). Rhizoma



repens filiforme ferrugineo-pilosum remote foliosum. Stipes cum fronde perpendiculariter pendulus filiformis 15–17 mm. longus subglaber fusco-nigricans. Frons usque 9 cm. longa usque 3 cm. lata ovato-lanceolata vel lanceolata oblongo-lanceo-

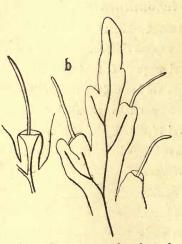


Fig. 73, Trichomanes cupressifolium HAYATA; a, the plant; b, a portion of the frond.

lata apice attenuata vel angustata ad summum obtusa basi acuta vel acutotruncata versus basin pinnata medio pinnatifida, pinnis alternis inferioribus longioribus, infimis brevioribus, superioribus gradatim breviori-

bus versus summum ad lobum simplicem reductis, pinnis inferioribus longissimis 15 mm, longis 6 mm. latis ovato-lanceolatis ad apicem obtusis basi

cuneatis pinnatilobis, lobis utroque latere 4–5 latere superiore plus numerosis latere inferiore minus numerosis oblongo-triangularibus, lobis mediis longissimis 2 mm. longis 1 mm. latis apice obtusissimis alternis, pinnis infimis brevioribus 1 cm. longis circ. unilateralibus vel valde obliquis, pinnis mediis a rhachibus frondium angulo 45° egressis. Rhachis frondis sursum 2 mm. lata; rhachis pinnæ inferioris 2 mm. lata. Frons supra medium usque ad prope apicem sorifera, pinnis singulis generaliter latere superiore sorum singulum gerentibus, vel interdum utroque latere sorum singulum vel soros duos gerentibus. Involucrum infundibulo-campanulatum 2½ mm. longum ore 1½ mm. latum utroque latere alatum, alis circ. ¼ mm. longis, ore truncato-rotundato, valvis subnullis, iis inferioribus quam superioribus paullo longioribus margine integris. Frons utraque pagine glabra margine integra leviter obscure vel haud crispato-undulata vel plus minus desuper recurva vel haud recurva, costis venis venulis utraque pagine elevatis; cellulæ vermiformes desunt.



Fig. 74, Trichomanes filiculum Boby.

HAB. Arisan, ad 8000-7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near Trichomanes humile FORST. (HOOK. et GREV. Ic. Fil. t. 85); but differs from it in having lobes on both sides of the pinnæ. Found in a dry place under a large crag in Mt. Tözan.

Trichomanes filiculum Bory (Fig. 74); Matsum. et Hayata Enum. Pl. Formos. p. 564.

Trichomanes bipunctatum Poir.; Matsum. et Hayata l.c. p. 564.

Hab. Kötőshő, leg. T. Kawakami et S. Sasaki, Juli., 1912, (No. 18).



Fig. 75, Trichomanes



Fig. 76, Trichomanes maximum Blume.

Trichomanes humile Forst. (Fig. 75); Matsum. et Hayata Enum. Pl. Formos. p. 565.

Hab. Kötöshö, leg. T. Kawakami et S. Sasaki, Juli., 1912, (No. 21).

Trichomanes maximum Blume (Fig. 76); Trichomanes thysanostomum Hayata in Matsum. et Hayata Enum. Pl. Formos. p. 568 (non Makino).

HAB. Kötöshö, leg. T. KAWAKAMI et S. SASAKI, Juli. 1912, (No. 16 et 20).

Compared with a specimen so named from the Philippines.

Trichomanes orientale C. Ch. (Fig. 77). Trichomanes japonicum Fr. et Sav. Enum. Pl. Jap. II. p. 207.

Hab. Arisan, ad 8000 ped. alt., leg. B. Hayata et S. Sasaki; Rinkiho, leg. H. Inaba, Aug. 1910.

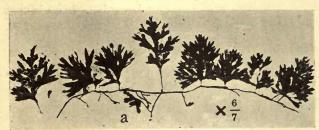
Trichomanes palmifolium HAYATA sp. nov. (Fig. 78). Rhi-

zoma repens filiforme breve pubescens nigricans remote radicans remote foliosum. Stipes 2–7 mm. longus basi nigricans glaber filiformis. Frons in ambitu cordato-ovata vel rotundato-ovata 14 mm. longa totiusque



Fig. 77, Trichomanes orientale C. Ch.; a. the plant; b, a portion of the frond.

lata pinnatiloba, lobis utroque latere 2-3, rhachibus 2 mm. latis, lobis obtriangulari-obcuneatis 5 mm. longis 4 mm. latis apice in ambitu truncatis basi



cuneatis apice alte duplo vel triplo lobulatis,



Fig. 78, Trichomanes palmifolium HAYATA; a, the plant; b, a portion of a frond; c, another portion of a frond, showing the vermiform strings on the latter.

lobulis ultimis 1-2 mm. longis $1-1\frac{1}{2}$ mm. latis apice acutis margine leviter superiore (sursum) recurvis crispato-undulatis; frons leviter recurva vel suberecta, costis frondis loborum vel lobulorum utraque pagine elevatis, utraque pagine pilis brevissimis pauce (præsertim ad costas) dispersis brevissimis apice clavatis. Involucrum ad lobulum lateralem terminale apice valvis 2 semi-

rotundatis 1½ mm. latis ½ mm. longis instructum basi complanatum campanulatum, campanulis ore 1¼ mm. latis 1 mm. altis (profundis), valvis ventralibus quam iis dorsalibus paullo majoribus.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

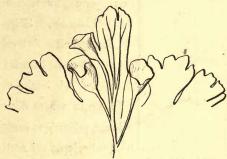




Fig. 79, Trichomanes rigidum Sw.

Near T. Makinoi C. Ch. = T. acutum Makino (Phanerog. et Pterid. I. t. 16), but differs from it by the shorter and broader fronds; from T. proliferum

(Bedd. Fern. South Ind. t. 262) by the much acuter lobes of the pinnæ. Also near *T. lutemarginule* Eaton (Hr. Br. Syn. Fil. p. 79) in the general

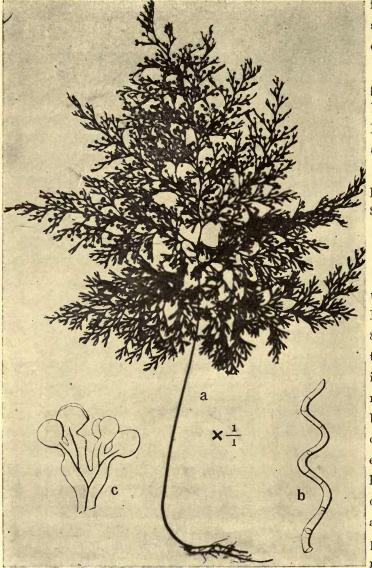


Fig. 80, Hymenophyllum constrictum HAXATA; a, the plant; b, a hair at the base of the frond; c, a portion of a pinnule.

llularibus 1-3 mm. longis. Frons triangulari-ovata 10 cm. longa totiusque lata apice acuta basi in ambitu subcordata bipinnata tri-quadri-pinnatifida, pinnis

form, but I could not satisfactorily identify our fern with it.

Trichomanes rigidum Sw.; (Fig. 79)
MATSUM. et HAYATA
Enum. Pl. Formos. p.
568.

Hab. Hieranzan, leg. B. Hayata et S. Sasaki, Juli., 1912.

Hymenophyllum Linn.

Hymenophyllconstrictum HAYATA sp. nov. (Fig. 80). Rhizoma repens teres gracillimum 1 mm. in diametro sectionis remote radicans, radicibus pilis longioribus dense obtectis. Stipes erectus gracilis 8-9 cm. longus teres 2 mm. in diametro ad basin vel ad apicem virgæ dense pilosus, pilisnigro-castaneis subcrispis vel rectis 1-seriatim multiceordinis I. mediis ovato-triangularibus a se 1 cm, remotis a rhachibus frondis 50°-60° egressis 5 cm. longis 3 cm. latis, pinnis ordinis II. infimis ab axilla inter frondem et pinnam infimam ordinis I. 5 mm. distantibus ovatis 2 cm. longis 1½ cm. latis apice obtusis basi oblique truncatis pinnatis vel bipinnatifidis, segmentis ultimis linearibus ½ mm. latis apice obtusis vel brevissime 2-lobatis vel soro terminatis, sub soro valde constrictis, partibus constrictis ¼ mm. latis ⅓ mm. longis stipitiformibus. Frons pagine utraque glabra, costis venis venulisque utraque elevatis, margine integra; rhachis frondis deorsum interrupte angustissime alata sursum distincte alata; rhachis pinnarum distincte alata. Involucrum ad basin 2-valvatim fissum bivalvatum terminale rotundatum latius quam longius 1 mm. longum margine subintegrum vel obscure denticulatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1913.

Near H. polyanthos, but differs from it by the broadly run'l receptacles with short stalks.

Hymenophyllum javanicum Spreng. (Fig. 81).

Hab. in monte Arisan, ad 7000-8000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Compared with a Japanese specimen so labelled in the Tökyö herbarium. Our fern looks to be a little different from it in having much broader lobes of the pinnæ.

Hymenophyllum parallelocarpum HAYATA sp. nov. (Fig. 82). Rhizoma repens gracillimum ½ mm. in diametro sectionis teres rubescens piloso-squamatum, pilis nigro-castaneis, remote radicans, radicibus pilosis. Stipes cum fronde perpendiculariter pendulus 2–2½ cm. longus gracillimus atro-castaneus glaber basi piloso-squamatus, squa-

mis piliformibus nigro-castaneis. Frons oblongo-lanceolata vel oboyato-lanceolata

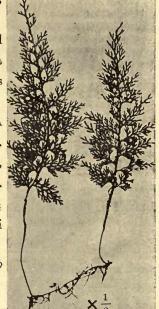


Fig. 81, Hymenophyllum jav micum Spreng.

10 cm. longa 4 cm. lata apice obtuso-acuta basi in ambitu cuneato-acuta bipin natifida, pinnis mediis longissimis a se 8 mm. remotis angulo 45°–50° a rhachibus egressis lineari-lanceolatis 3 cm. longis 12 mm. latis apice obtusis oblique cuneatis sessilibus, pinnulis vel segmentis linearibus inferioribus a se 3–4 mm.



remotis 6–7 mm. longis 2–lobatis vel simplicibus, lobis linearibus 2 mm. longis 1 mm. latis apice truncato-rotundatis vel leviter emarginatis vel apice soro terminatis, segmentis vel lobis soriferis apice sub soro plus minus constrictis æquilatis cum involucro. Frons integra pallidofusca utraque glabra, costis venis

utraque pagine
distincte elevatis rubrocastaneis glabris; rhachis
frondis alata
medio cum
alis 1 mm. lata
vel latior. In-

volucrum late

Fig. 82, Hymenophyllum parallelocarpum HAYATA; a, the plant; b, a portion of a pinna.

rotundatum vel rotundato-semi-orbiculare basi truncatum haud constrictum minus 1 mm. latum margine integerrimum apice perfecte rotundatum minus 1 mm. longum latius quam longius glabrum usque ad basin 2-valvatim fissum.

HAB. Arisan, ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Near *H. rarum* R. Br. (Kunze Farnkräuter I. t. 96), but differs from it by the much more branched fronds. Also near *H. Wrightii* V. D. Bosch, (Makino Phanerog. et Pterid. Vol. I. t. 17.), but separable from it by the more pinnatifid pinnæ.

Hymenophyllum polyanthos Sw.

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Compared with a specimen so labelled in the Tökyö herbarium. fern seems to vary a very wide range.

Polypodiaceæ.

Cystopteris Bernhard.

Cystopteris formosana Hayata sp. nov. emittens.

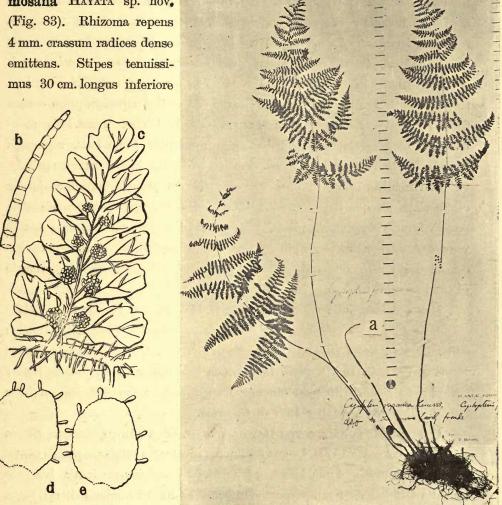


Fig. 83, Cystopteris formosana HAYATA; a, the plant b, a hair on the surface of the frond; c, a pinnule; d and e, indusia.

2 mm. in diametro teres basi castaneus sursum flavo-stramineus piloso-squamatus pauce pilosus basi dense sursum pauce squamatus, squamis mediis triangulari-lanceolatis, inferioribus triangulari-cuspidatis 5 mm. longis basi 2 mm. latis basi latissimis, superioribus minoribus tenuissimis margine glandulosociliolatis, pilis tenuissimis multi-cellularibus. Frons ovato-lanceolata vel triangulari-lanceolata 22 cm. longa 10-12 cm, lata apiee ambitu acuminata basi truncata vel rotundata bipinnata, pinnis inferioribus longioribus suboppositis a se 3 cm, remotis a rhachibus angulo 80°-90° divaricatis rectis vel ± recurvis sessilibus lanceolatis 7 cm. longis 3 cm. latis apice acuminatis basi truncatis æquilateralibus, pinnulis inferioribus a rhachibus angulo recto divaricatis linearioblongis 18 mm. longis 7 mm. latis a se 7 mm. remotis apice obtusis basi truncato-acutis sessilibus pinnatifidis inferiore ad costam superiore prope costam fidis, segmentis rectangularibus 4 mm. longis basi circ. 2 mm. latis apice truncatis margine lobulatis, lobulis apice rotundatis 1 mm. latis, segmentis superioribus brevioribus subintegris. Textura tenuissime herbacea; frons pallidoviridis, rhachibus frondium breve pilosis; costulæ pinnularum supra leviter canaliculatæ utroque latere canaliculorum densiuscule pilosæ supra elevatæ; pagina frondis densiuscule pilosa, pilis articulatis multicellularibus, venis et venulis utraque pagine parce pilosis. Sori utroque latere costa pinnularum prope costam 1-seriatim dispositi globosi. Indusium oblongum margine remote glanduloso-ciliolatum.

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Near C. japonica Leurs., but differs from it by the more hairy fronds; still nearer C. setosa (Bedd.) (Bedd. Fern. Br. Ind. t. 312 and Lastrea setosa Bedd. Fern. Brit. Ind. t. 262), from which this differs by the oblong nearly orbicular indusium with glanduliferous margin and by the very much smaller fronds. Perhaps a smaller form of C. setosa.

Cystopteris sphærocarpa Hayata sp. nov. (Fig. 84). Rhizoma. Stipes stramineus flexuosus 18 cm. longus basi parce squamatus nitidus, squamis ovato-oblongis vel ovatis 4 mm. longis $1\frac{1}{2}-2$ mm. latis apice acuminatis basi rotundatis tenuissimis fusco-purpurascentibus. Frons triangularis 12 cm. longa 10 cm. lata basi latissima apice tenuissime lineari-acuminatissima pinnata, pinnis inferioribus longioribus lanceolatis $3\frac{1}{2}$ cm. longis a se $1\frac{1}{4}$ cm. remotis

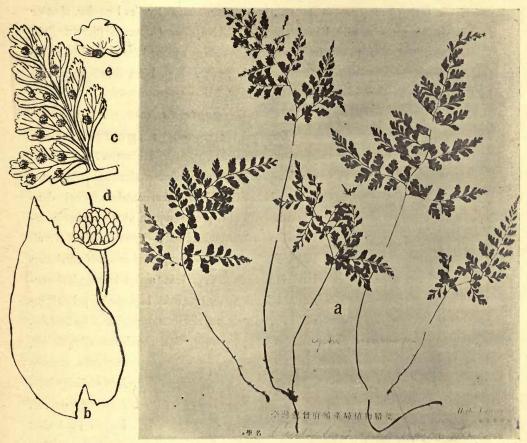


Fig. 84, Cystopteris spharocarpa HAYATA; a, the plant; b, a scale on the stipe; c, a pinnule; d, a sorus; e, an indusium.

a rhachibus frondium angulo 90° divaricatis, infimis valde longissimis lanceolatis 5½ cm. longis 23 mm. latis apice acutis ad summum obtusis basi truncatis plus minus angustioribus brevissime petiolatis, pinnulis inferioribus a se 18 mm. remotis oblique ovatis 12 mm. longis 7 mm. latis apice ambitu rotundatis basi late oblique cuneatis brevissime petiolulatis lobulatis, lobulis oblongis margine minute denticulatis, partibus cuneatis integris. Textura herbaceo-membranacea. Sori basi lobulorum singuli globosi. Indusium late rotundatum margine irregulariter erosum.

Hab. in monte Morrison, ad 11000 ped. alt., leg. T. Kawakami et S. Sasaki, Oct., 1909.

Near Cystopteris fragilis Bernh., but differs from it by the broader, shorter fronds with more obtusely lobed pinnules. Also near C. tenuis (Lowe Brit. Exot. Fern. Vol. VII. p. 35) from which this differs by the triangular bipinnate fronds; from C. moupinensis (Franchet Pl. David. II. p. 149), this is separable in the bipinnate (but not tripinnate) fronds.

Dryopteris Adanson.

Dryopteris (Ctenitis) angustodissecta Hayata sp. nov. (Fig. 85). Rhizoma? Stipes 20 cm. longus ferrugineo-rubro-castaneus pubescens, pilis pluricellularibus rubescentibus, basi densiuscule sursum parce squamatus, squamis inferioribus ovato-lanceolatis 6–8 mm.longis 1–2 mm. latis. Frons elongato-triangulari-ovata 45 cm. longa basi latissima 22 cm. lata apice triangulari-acuminata basi acuto-truncata bipinnata vel tripinnatifida, pinnis inferioribus oppositis a se 5–6 cm. remotis angulo 80°–90° a rhachibus divaricatis,

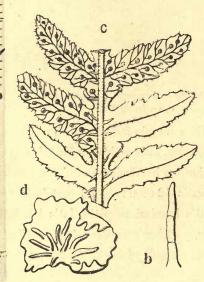


Fig. 85, Dryopteris (Ctenitis) angustodissecta Hayata; a, the plant; b, a hair on the costa of a pinnule; c, a portion of a pinnule; d, an indusium.

a

infimis lanceolato - triangularibus 13-14 cm. longis basi 8-9 cm. latis apice acuminatis basi latissimis breve petiolatis (petiolis 8 mm. longis), pinnulis infimis latere inferiore praesertim longissimis 6 cm. longis 2 cm. latis lineari - lanceolatis apice acuminatis basi truncatis latissimis sessilibus basi pinnatis sursum pinnatifidis, pinnulis ordinis secundarii vel segmentis inferioribus ovato-triangularibus 1 cm. longis 7 mm. latis apice obtusis basi truncatis latissimis sessilibus vel breve petiolulatis margine lobulatis; frons basi usque ad summum sorifera herbacea supra pubescens subtus ad costam costulas venas venulasque tenuiter

pubescens, pilis pluri - cellularibus. Sori utroque latere costulæ pinnularum vel segmentorum 1-seriatim dispositi. Indusium subreniforme ad centrum pilosum.

HAB. Köshūn: Kuraru, leg. B. HAYATA et S. SASAKI, Mai. 1912.

Near D. dissecta (Desv.); but differs from it by the much narrower pinnæ and pinnules with narrower lobes.

Dryopteris (Lastrea) apiciflora (WALL.) O. KTZE. (Fig. 86); HOOK. Sp. Fil. VI. t. 248.

Lastrea apiciflora (Hook.) Bedd. Fern. Brit. Ind. t. 40.

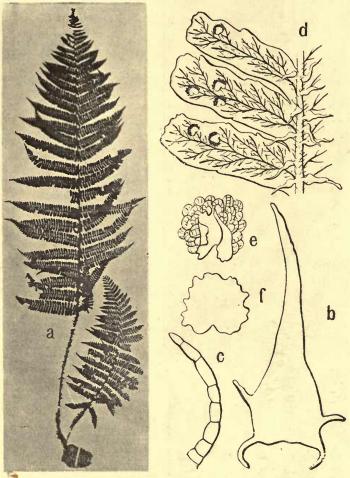


Fig. 86, Dryopteris (Ctenitis) apiciflora; a, the plant; b, a scale on the under surface of a costa of a pinna; c, a hair on the upper surface of a costa of a pinna; d, portion of a pinna; e. a sorus; f, an indusium.

Hab. Arisan, ad 7000-6000 ped. alt., leg. B. Hayata et S. Sasaki, Jan. 1912. Epiphytica vel terrestris.



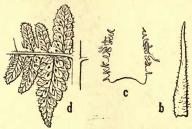


Fig 87, Dryopteris (Lastrea) aurita C. Ch.; [a, the plant; b, a scale on the rhizome; c, basal part of the same; d, basal part of a pinna.



Fig. 88-A, Dryopteris crenuta C. Ch.; a, the plant.

Dryopteris (Lastrea) aurita C. Chr. (Fig. 87) Ind. Fil. p. 253 (1905).

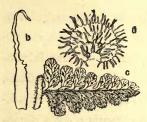


Fig. 88-B, Dryopteris crenata O. Ktze.; b, a scale at the base of the stipe; c, pinnule; d, an indusium.

Gymnogramme aurita Hook. Ic. t. 974. Aspidium aurita (Hook.); Matsum. et Hayata Enum. Pl. Formos. p. 579.

Hab. Rahao, leg. T. Sōma, 1910. Dec. **Dryopteris** (*Eudryopteris*) **crenata** O. Ktze. (Fig. 88, A-B).

Hypodematium Rüppellianum Kunze Farnkräuter I. p. 41, t. 21 (1840).

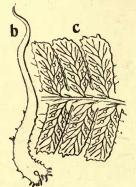
Nephrodium odoratum Baker Syn. p. 280.

Hab. Montibus centralibus, leg. U. Mori et S. Katō, Dec. 1909.

It is rather doubtful that this is identical with D. crenata, for there is a little difference regarding the size of the stipes and the hairly state of the fronds. This slightly differs from the Japanese specimen labelled N. odoratum Baker. The sori of our fern are much larger than those of the Japanese.

Dryopteris (Eudryopteris) cyrtolepis HAYATA sp. nov. (Fig. 89). Rhizoma? Stipes 27 cm. longus basi 1 cm. in diametro cum rhachibus densiuscule squamatus, squamis variabillimis lanceolatis usque filiformibus basi densissime dispositis usque 2 cm. longis

castaneis. Frons in ambitu lanceolata 100 cm. longa 30 cm. lata apice subito acuminata basi gradatim angusta ad basin 10 cm. lata pinnata, pinnis linearibus mediis longissimis 15 cm. longis 2 cm. latis a se 3 cm. remotis suboppositis apice acuminatis basi latissimis truncatis pinnatifidis basi ad rhachin fissis sursum





prope rhachin fissis, segmentis b, a scale on the frond-rhachis; c, portion of a pinna.

inferioribus rectangularibus 1 cm. longis 5 mm. latis apice truncatis margineo bscure et remote serrulatis vel subintegris apice obscure denticulatis. Pinnæ medio
deorsum a rhachibus frondis angulo recto divaricatæ apice plus minus falcatoascendentes, inferioribus a se 3 cm. remotis brevioribus plus minus reflexis,
infimis 6 cm. longis 1½ cm. latis, superioribus ascendentibus a rhachibus frondium 50°-60° divaricatis brevioribus a se approximatis, segmentis a costa pinnarum angulo 80° egressis. Costæ pinnæ supra leviter canaliculatæ squamis
minutis obtectæ, subtus elevatæ squamis majoribus densiuscule obtectæ, costulis
segmentorum supra tenuiter impressis subtus tenuiter elevatis, venis venulis
supra non visis, subtus distincte visis tenuissimis. Frons herbaceo-coriacea



supra subglabra subtus ad venas pauce squamata vel subglabra margine pilis tenuissimis longissimis pauce instructa. Sori utroque latere costæ segmentorum 1-seriatim dispositi. Indusium cordato-reniforme.

Hab. Mt. Arisan, leg. B. Hayata et S. Sasaki. Jan., 1912.

Dryopteris (Ctenitis) Eatoni (BAK.) O. KTZE. (Fig. 90).

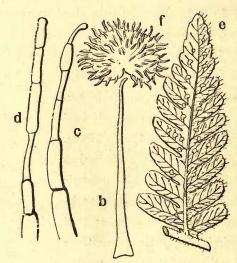


Fig. 90, Dryopteris Eatoni O. Ktze.; a, the plant; b, a scale at the base of the stipe; c, d, hairs on the frond; e, a pinnule; f, an indusium.

HAB. Kōtōshō, leg. K. MIYAKE, Nov., 1899.

Compared with a specimen so labelled from the Philippines.

Dryopteris (Lastrea) Beddomei

(Bak.) O. Ktze. (Fig. 91).

Hab. Rinkiho, ad7000 ped. alt., Aug.1911, leg. H. INABA.

Dryopteris (Lastrea) gracilescens (BL.) O. KTZE. (Fig. 92).

Hab. Arisan, leg. B. Hayata et S. Sasaki Jan., 1912.

Compared with a specimen so labelled in the herbarium of Tōkyō.



Fig. 91, Dryopteris (Lastrea) Beddomei O. Krz.; c, the plant; b, a pinna.

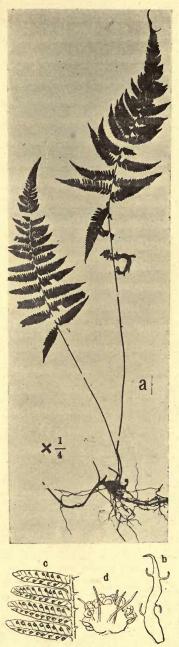
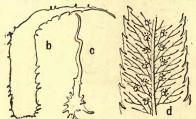


Fig. 92, Dryopteris (Lastrea), gracilescens O. Ktze.; a, the plant; b, a scale; c, portion of a pinna; d, a sorus.





Dryopteris (Eudryopteris) hirtipes (Bl.), O. Ktze. (Fig. 93).

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan. 1912.

Compared with a specimen so labelled in the herbarium of Tōkyō.

Dryopteris (Phegopteris) fluvialis HAYATA sp. nov. (Fig. 94). Rhizoma ascendens suberectum. Stipes 50-60cm.longus basi pauce squamatus toto glaberrimus, squamis cuspidato-ovatis 3 mm. longis 2 mm. latis integris apice acuminato-cuspidatis basi ± cordatis. Frons 65 mm. longa 50 cm. lata ovato-triangularis apice acuminata infra medium latissima basi minus lata basi subtruncata bipinnata vel tripinnata, pinnis 30 cm. longis 10 cm. latis lineariinfimis lanceolatis apice acuminatissimis basi truncatis subsessilibus vel brevissime petiolatis, pinnulis ordinis primarii infimis lanceolatis sessilibus 8 cm. longis 2½ cm. latis acuminatissimis basi truncatis, pinnulis ordinis secundarii infimis oblongo-lanceolatis 18 mm. longis 8 mm. latis apice obtusissimis basi leviter adnatis margine lobulatis, lobulis quadrangularibus 3 mm. longis 2 mm. latis apice truncatis a rhachibus 1 mm. distantibus utroque latere costularum 1-seriatim soriferis; frons textura tenuiter herbacea, in Pinnæ inferiores a se exsiccato fuscens.

Fig. 93, Dryopteris hirtipes O. KTZE.; a, the plant; b, a scale on the stipe; c, a scale on the rhachis, smaller one; d, a portion of a pinna.

10 cm. remotæ a rhachibus frondium angulo 40°-50° divaricatæ, pinnulis ordinis primarii inferioritus a se 3 cm. remotis a rachibus pinnarum 70°-80° divaricatis, pinnulis ordinis secundarii inferioribus a se 1 cm. remotis a rhachibus

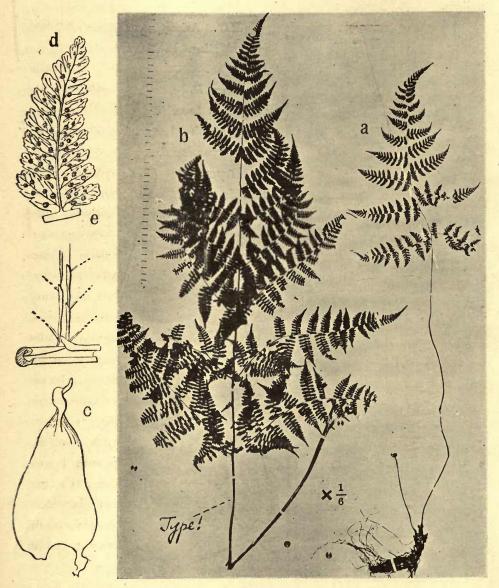
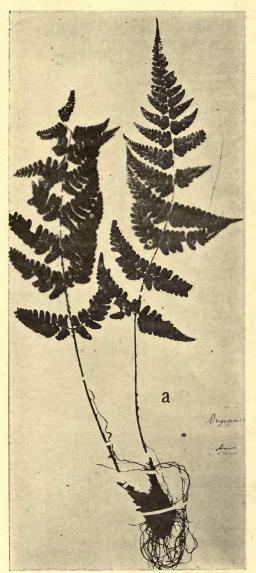


Fig. 94, Dryopteris fluvialis HAYATA; a, a smaller specimen of the plant; b, a larger one; c, a scale on the rhizome; d, a pinnule; e, portion of a setulose costula (upper surface)

pinnularum angulo recto egressis; costis pinnularum supra canaliculatis utroque latere canaliculorum alato-costulatis, costulis remote setuliferis, setulis complanatis ½ mm. longis. Sori rotundati haud involucrati. Indusium nullum.



Hab. Arisan, secus fossas, ad 7–8000 ped. alt., leg. B. Hayata et S. Sasaki, 1912, Jan.

Near *D. crenulato-serrulata* C. Ch., but differs from it by the much fewer scales at the base of the stipes and much larger fronds.

Dryopteris (Eudryopteris) hypophlebia Hayata sp. nov. (Fig. 95). Rhizoma suberectum apice stipites cæspitosos gerens. Stipes 15–20 cm. longus sursum pauce basi densissime squamatus, squamis inferioribus ovatis lanceolatis



Fig. 95, *Dryopteris hypophlebia* HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule.

tenuissimis castaneis fuscis usque 11 cm. longis4mm. latis apice longe cuspidato-acuminatis margine subintegris, squamis (ad rhachin) minoribus cuspidatoovatis 3 mm. long is 1 mm. latis margine remote setosis fusco-nigricantibus. Frons ovato-lanceolata 30 cm. longa 13 cm. lata apice acuminata basi truncata pinnata, pinnis superioribus brevioribus, inferioribus longioribus sub-æquilongis a se 4 cm. remotis suboppositis a rhachibus angulo 50° – 80° divaricatis pyramidali-lanceolatis 8 cm. longis $2\frac{1}{2}$ cm. latis subsessilibus vel breve petiolatis (petiolis 3 mm. longis) inæqualibus, latere superiore quam latere

inferiore angustioribus, pinnatis vel pinnatifidis, segmentis infimis (latere inferiore) longissimis 1½ cm. longis 8 mm. latis oblongo-rectangularibus apice rotundatis basi truncato-contractis margine inferiore lobulatis superiore duplicato-serrulatis; textura coriacea; costæ pinnarum basi ± canaliculatæ sursum planæ distincte coloratæ subtus elevatæ ± squamatæ, costulis venis venulisque supra impressis subtus leviter elevatis distincte coloratis distincte visis tenuissimis; pagina supra viridissima

subtus pallidior. Sori utroque latere costulæ segmentorum 1—seriatim a basi usque medium frondis dispositi. Indusium cordatum.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Dryopteris (Ctenitis) Kawakamii
HAYATA (Fig. 96),
Mater. Fl. Formos. p.
416. Stipites erecti
14 cm. longi dorso
(supra) 3-sulcati
stramineo - rubescentes
squamati, (squamis
copiosis imbricatis in

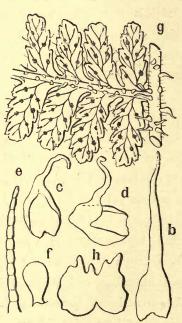




Fig. 96, Dryopteris (Ctenitis) Kawakamii HAYATA; a, the plant; b, a scale on the stipe; c, d, scales on the costa of a pinna; e, a hair on the upper surface of the costa of a pinna; f, a glandular hair on the under surface of the costa of a pinna; g, basal portion of an upper pinna h, an indusium.

magnitudine variabilibus lineari-cuspidatis acuminatis fusco-stramineis 8-9 mm. longis 1 mm. latis interdum basi cordatis), etiamque pilis crispatis dense obtecti. Frondes lanceolatæ in ambitu 50 cm. longæ 15 cm. latæ apice acuminatæ basi obtusæ bipinnatæ, pinnis lateralibus angusto-lanceolatis sessilibus, superioribus a rhachibus angulo 90° patentibus, inferioribus et infimis reflexis, pinnis sub pinna media frondis longissimis 10 cm. longis 2 cm. latis apice acuminato-linearibus a medio usque ad basin æquilatis, pinnis infimis brevissimis reflexis angulo 150° a rhachibus patentibus 2½ cm. longis 1 cm. latis, pinnis utroque latere frondium 30 a se 1-1½ cm. remotis; rhaches supra sulcatæ pilosæ squamatæ, rhachillæ supra sulcatæ dense rubro-hirsutæ subtus paucissime pilosæ squamis lanceolatis 1-2 mm, longis basi ventricosis instructæ; pinnulæ ad medium pinnarum late lineares 1 cm. longæ 3 mm. latæ sessiles æquilatæ obtuse dentatæ, (dentibus utroque latere 3-4-5 plus minus ascendentibus vel transversis obscuris), supra densiuscule subtus parcissime strigoso-pilosæ, (pilis rigidis crispatis 1 mm. longis), margine plus minus revolutæ, (venulis liberis), sub quoque dente 1-soriferæ, rarius 2-soriferæ. Sori depresso-orbiculares 1 mm. in diametro, receptaculis a margine ½ mm. remotis, indusiis generaliter obsoletis rarius late orbicularibus cordatis.

Hab. Randaisan, leg. U. Mori, 1908, Aug. (No. 7134).

Dryopteris (Eudryopteris) Kodamai Hayata sp. nov. (Fig. 97). Rhizoma? Stipes 14 cm. longus tereto-complanatus basi dense squamifer, squamis inferioribus maximis $1\frac{1}{3}$ cm. longis 2 mm. latis linearibus acuminatis, sursum glabratus. Frons triangularis vel late pentagona 15 cm. longa totiusque lata vel latior apice triangulari-acuta basi latissima bi-tri-pinnata, pinnis suboppositis (pinnis inferioribus bipinnatis, pinnis superioribus pinnatis), pinnis infimis longissimis 10 cm. longis bipinnatis vel bipartitis petiolatis, (petiolis 1 cm. longis), partibus inferioribus (vel pinnulis infimis) cum superioribus æquilongis vel brevioribus 8 cm. longis lanceolatis pinnatis, pinnulis lanceolatis inferioribus $1\frac{1}{2}$ cm. longis 5 mm. latis apice obtusis basi cuneatis basi±adnatis sessilibus margine duplicato-serratis, serris aristatis; frons a medio sursum sorifera; sori utroque latere pinnularum 1-seriatim siti; pinnis inferioribus a se 2-3 cm. remotis angulo 45° a rachibus frondium divaricatis, pinnulis in-

ferioribus primariis vel secundariis inferioribus a se 5 mm. remotis a rhachibus

angulo 60° egressis; textura herbaceocoriacea. Costulæ pinnularum supra canaliculatæ utroque latere
canaliculorum interrupte costulatæ. Sori
valde elevati globosi.
Indusium cordatum
globosum 1 mm. in
diametro.

Hab. In monte Taiton, ad 1200 metra alt., leg. U. FAURIE, 1903, mai.

Remarkable for the very much elevated sori.

Dryopteris (Ctenitis) kusukusensis
Hayata sp. nov. (Fig. 98). Rhizoma? Stipes rhachibus costis venisque totis castaneorubescens sub lente minute pubescens, pilis pluricellularibus, 30 cm. longus basi dense sursum parce squamatus,



Fig. 97, Dryopteris Kodamai HAYATA.

squamis lineari-lanceolatis 5–8 mm. longis 1–2 mm. latis. Frons ovato-lanceolata 45 cm. longa 22 cm lata apice acuminata basi in ambitu cordata pinnata vel infima bipinnatifida, pinnis inferioribus lanceolatis sub-oppositis a se 5 cm. remotis a rhachibus frondium angulo 80°–70° divaricatis,



pinnis infimis obliquis vel semi-triangularibus 11 cm. longis basi latissimis 9 cm. latis latere superiore 1-2 cm. latis latere inferiore 7 cm. latis basi ad costam pinnatifidis, pinnulis vel segmentis infimis (latere inferiore) longissimis lineari-lanceolatis 7½ cm. longis 18 mm.



Fig. 98, Dryopteris kusukusensis HAYATA; a, the plant; b, a scale on the stipe; c, apica portion of a pinna; d, e, hairs on the frond.

latis apice acuminatis basi ± contractis a se 1½ cm. remotis a costa angulo 50° egressis, margine regulariter lobulatis, lobulis oblongo-rectangularibus apice obtusissimis basi latissimis 6 mm. longis 4 mm. latis; textura herbacea. Frons medio sursum sorifera. Indusium rotundato-cordatum.

Hab. Kusukusu, Juli., 1912, leg. B. Hayata et S. Sasaki.

Very near D. membranoides HAYATA, but

differs only by the thicker herbaceous texture.

Dryopteris (Cyclosorus) lævifrons Hayata sp. nov. (Fig. 99). Rhizoma? Stipes 70 cm. longus basi circ. 1 cm. in diametro squamis parcissime instructus lævis stramineus, (squamis linearibus circ. 1 cm. longis), sursum pinnis reductis auriculiformibus 2–4 instructus, auriculis triangularibus lobulatis 1 cm. longis 1 cm. latis basi non adnatis sessilibus apice obtusis vel rotundatis a se 5 cm. remotis. Frons 90 cm. longa 25 cm. lata in ambitu lanceolata apice longe acuminatissima basi acuta pinnata, pinnis subalternatis linearibus, inferioribus

longissimis infimis paullo brevioribus, superioribus gradatim brevioribus versus apicem gradatim ad lobum pinnæ terminalis abeuntibus; pinna terminali lineari lateralibus conformi pinnis mediis æquilonga, pinnis mediis linearibus 17 cm. longis 12 mm. latis apice acuminatissimis basi sessilibus vel brevissime petiolatis

margine truncato-dentatis vel lobulatis, (dentibus

inferioribus quadrangularibus truncatis latere superiore 1 mm. longis latere inferiore 2 mm. longis apice truncatis ad centrum emarginatis interdum versus latus superius acutis, dentibus superioribus triangularibus acutis ascendentibus), apice ad acumen subintegris: Textura membranacea, pagina glaberrima vel supra ad costam pinnæ paucissime hirsuta, costis supra elevatis tenuiter sulcatis subtus elevatis, costulis venis venulisque utraque pagine tenuiter distincte elevatis, pinnis a rhachibus frondium, et costulis a costa pinnæ circ. angulo 60° egressis, pinnis inferioribus a se 3 cm. remotis, pinnis cum rhachibus frondium articulatis in exsiccato articulatim solutis. Sori utroque latere costulæ dentium 1-2 vel 1-seriatim dispositi vel utroque latere costæ pinnæ 1-seriatim dispositi. Indusium reniforme.

Нав. Köshūn, Kuraru, leg.В. Науата, Juli., 1912.

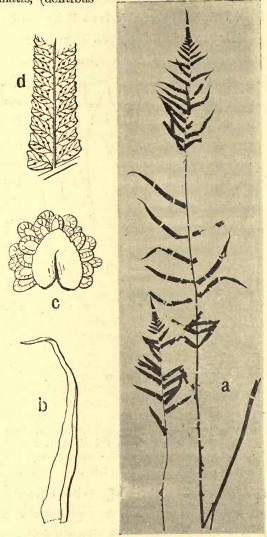


Fig. 99, Dryopteris (Cyclosorus) lævifrons HAYATA; a, the plant; b, a scale on the stipe; c, a sorus; d, portion of a pinna.

Near D. truncata O. Ktze., but differs from it by the much more smooth stipes and much more truncate lobes of the pinnæ. Also near Nephrodium eusorum (Bedd. Fern. Brit. Ind. t. 130), but differs from it by the less divided or lobed pinnæ and far much smaller form of the fronds. It bears some resemblance to Neph. extensum Blume var. minor (Bedd. Fern. Brit. Ind. t. 201), but distinguishable from it by the truncately lobed pinnæ.

Dryopteris (Eudryopteris) thysanocarpa HAYATA (Fig. 100) = Athyrium thysanocarpum HAYATA. Rhizoma? Stipes 13 cm. longus tenuis-

a x 3/8

Fig. 100, Dryopteristhysanocarpa HAYATA; a, the plant; b, a scale on the stipe; c, a pinna; d, a sorus; d, another sorus to be found at apical portions of the frond.

simus basi dense medio parce squamatus sursum glabratus, squamis lanceolatis linearibus 2-3 mm. longis acuminatis margine integris vel ± serrulatis. Frons lanceolata 16 cm. longa 37 mm. lata apice acuminatissima inferne æquilata basi truncata pinnata, pinnis mediis longissimis 2 cm. longis oblique triangularibus 1½ cm. latis latere superiore quam latere inferiore latioribus apice obtusissimis basi truncatis petiolatis (petiolis 2 mm. longis) margine inferne incisolobulatis superne dentato-lobulatis, lobis infimis superioribus oblongis 7 mm. longis 4 mm. latis apice rotundatis margine repandis basi cuneatis; pinnis infimis a rhachibus frondium angulo recto, superioribus angulo 80° divaricatis, lobis infimis pinnarum

mediarum a costa pinnæ angulo recto divaricatis, pinnis inferioribus a se 12 mm. remotis, pinnis infimis ± desuper reflexis. Textura herbacea; rhachis frondis recta. Sori utroque latere pinnæ uniseriatim siti vel utroque latere loborum pinnularum uniseriatim siti elevato-globosi plus quam 1 mm. in diametro. Indusium reniforme vel rotundatum margine fimbriato-denticulatum.

HAB. Biöritsu: Rokujödaisan, leg. U. Mori, 1908, Oct.

The fronds are exactly like those of *Microlepia Wilfordii* Moore or *M. rhom-boidea* (Hook. 2nd Cent. Fern. t. 48), but the fructification is undoubtedly that of *Dryopteris*. Indusium is generally cordate or sometimes oblong, attaching to the fronds by one side and tends to be like that of *Athyrium*. It is especially so towards

the apex of the fronds.

Near Cystopteris Douglasii (Hook. Ic. Pl. t. 955) and Cystopteris tasmanica (Hook. Ic. Pl. t. 955), but differs from them by the petiolate more deeply lobed or pinnatifid pinna.

Dryopteris (Eudryopteris lepidopoda HAYATA sp. nov. (Fig. 101). Rhizoma? Stipes 23 cm. longus rhachibus densissime squamatus, squamis lineari-lanceolatis 7 mm. longis 1-2 mm. latis apice longe acuminatis basi rotundatis remote ciliolatis vel subintegris. Frons quam stipite multo longior 50 cm. longa 23 cm. lata ovatolanceolata pinnata, pinnis mediis longissimis lineari - lanceolatis 13 cm. longis basi latis-

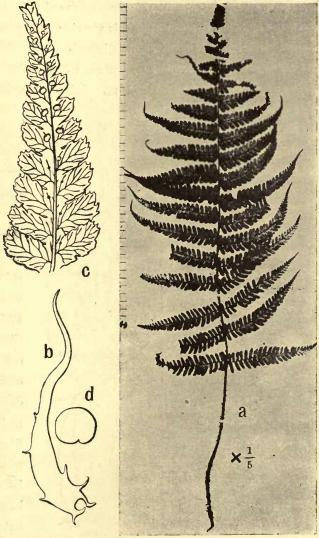


Fig. 101, Dryopteris lepidopoda HAVATA; a, the plant; b, a scale on the rhachis of the frond; c, apical portion of a pinna; d, an indusium.

simis 24 cm. latis truncatis sessilibus a se 24 cm. remotis angulo recto divari catis pinnatim fidis inferiore ad rhachin fidis superiore prope rhachin fidissegmentis inferioribus rectangularibus 13 mm, longis 5 mm, latis apice subtruncatis vel rotundatis margine remote obscureque serrulatis vel subintegris apice

> denticulatis; frons chartacea, costa pinnarum supra subplana subtus elevata, venis et venulis supra non elevatis vix visis subtus castaneo-coloratis tenuissimis distincte visis. Sori utroque latere costulæ segmentorum 1-seriatim dispositi. HAB. Arisan, leg. B. HAYATA et S. SASAKI,

Jan., 1912.

Near D. pachyphylla HAYATA, but differs from it by the thinner, less black and less ciliated scales on the rhachis, and by the thinner fronds.

Dryopteris (Eudryopteris) leptorhachia HAYA-TA sp. nov. (Fig. 102). Rhizoma erecto-ascendens. Stipes cum rhachibus nitidus castaneus vel castaneo-rubescens 50 cm. longus inferiore dense superiore parce squamatus, squamis inferioribus lineari-lanceolatis apice acuminatis 2 cm. longis 2 mm. latis. Frons ovata 40-50 cm. longa 30-40 cm. lata bipinpinnis inferioribus nata, longioribus a se 11 cm. remotis angulo 40° a rhachibus

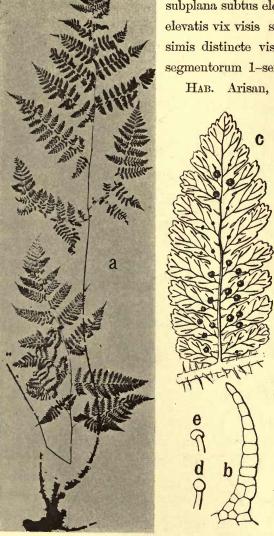


Fig. 102. Dryopteris leptorhachia HAYATA; a, the plant; b, a hair on the costa of a pinnule; c, a pinnule or a segment of a pinnule; d, e, glandular hairs on the costa of a pinnule.

egressis, infimis ovato-oblongis 25 cm. longis 12 cm. latis apice acuminatis basi rotundatis petiolatis (petiolis 2 cm. longis) pinnatis, pinnulis mediis longissimis a se 2 cm. remotis a costa pinnæ angulo 50° – 80° egressis lineari-oblongis $6\frac{1}{2}$ cm. longis 22 mm. latis apice acuminato-obtusis basi truncatis breve petiolulatis

ad costas pinnatifidis, segmentis lineari - oblongis 12 mm. longis 5 mm. latis apice obtuso-rotundatis basi contractis decurrentibus lobulatis ad summum serrulatis, lobulis 1–2 mm. longis apice ± serrulatis. Textura herbacea pagine pilis pluricellularibus parce dispersa; costa pinnularum supra canaliculata, costulæ utroque latere canaliculorum costæ sitæ lamellatæ; venis venulisque subtus distincte visis. Sori ad basin segmentorum vel lobulorum segmentorum dispositi.

Hab. Arisan, leg. B. HAYATA; et S. SASAKI, Jan., 1912.

Somewhat near *D. Matsumurce*, but differs from it by the serrulate lobes of the pinnules.

Dryopteris (Ctenitis) leucostipes (BAKER) C. CH. (Fig. 103, A-B), HAYATA Mater. Fl. Formos. p. 418.

Hab. Keelung.

Distrib. Liukiu.

Dryopteris (Eudryopteris)
melanocarpa Hayata sp. nov.



Fig. 103-A, Dryopteris leucostipes C. Ch.; a, the plant.

(Fig. 104). Rhizoma erectum ascendens. Stipes 30–40 cm. longus rubro-castaneus basi squamatus, squamis inferioribus latissimis amplexicaulibus ovatis 7 mm.

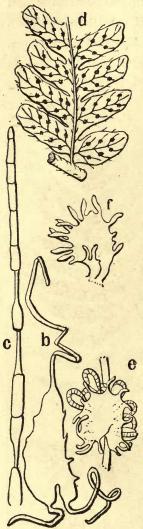


Fig. 103-B, Dryopteris leucostipes C. Ch.; b,
a scale on the under surface
of a pinna; c, a hair on the
frond; d, a portion of a
pinna; e, a sorus; f, an indusium.

margine duplicatoserrulatis; pinnis inferioribus a se 8 cm. remotis superioribus lanceolatis acuminatissimis, (acuminibus linearibus serrulatis) a rhachibus

longis 3-4 mm. latis apice acutis basi roundatis integris tenuissimis stramineo-castaneis, squamis superioribus gradatim angustioribus. Fronsovata 34 cm. longa 25 cm. lata apice acuminata basi in ambitu cordata bipinnata vel bipinnatifida, pinnis suboppositis, infimis longissimis 17 cm. longis versus apicem valde falcatis hastato-bipartitis, pinnis reliquis triangularilanceolatis falcatis, pinnis infimis 17 cm. longis longissimis breve petiolatis falcatis hastato - bipartitis, partibus inferioribus lanceolatis 9-10 cm. longis 2½ cm. latis apice acuminatis basi truncatis subsessilibus superiore falcatis pinnatifidis, segmentis infimis oblongis 14 cm. longis 6 mm. latis apice obtusissimis basi cuneatis latere inferiore ad rhachin decurrentibus



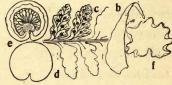


Fig. 104, Dryopteris melanocarpa Hayata; a, the plant; b, a scale on the rhizome; c, portion of a pinnule; d, a sorus, seen from above; e, the same, seen from below; f, an indusium after dispersion of spores.

frondium angulo 70° divaricatis, pinnulis inferioribus a se 2 cm. remotis, partibus pinnæ infimæ retrorsum reflexis falcatis. Sori valde elevato-globosi; indusia reniformi-cordata 1 mm. lata. Textura herbaceo-membranacea.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near D. Sabaei in the outline of the fronds and globose elevate sori;

but differs from it by the much more accuminate pinnæ. This is still nearer to D. sparsa O. Kuntze (Nephrodium sparsum Don), but distinguishable from it by the lowest pinnæ with much longer pinnules.

Dryopteris (Eudryopteris) membranoides Hayata sp. nov. (Fig. 105). Rhizoma
erectum. Stipes 30 cm. longus squamatus cum
rhachibus et costis pinnarum castaneo-rubescens
breve pubescens, squamis lineari-lanceolatis 1
cm. longis 1–2 cm. latis acuminatis. Frons
ovato-lanceolata 60 cm. longa 30 cm. lata infra
medium latissima pinnata vel infima bipinnatifida, pinnis inferioribus lineari-lanceolatis
sessilibus a se 4 cm. remotis a rhachibus
frondium angulo 80°–90° egressis, infimis oblique

triangularibus velsemi-triangularibus 14 cm. longis basi 11 cm. latis latere superiore 2 cm. latis latere inferiore 8 cm. latis basi ad costam pinnatifidis, segmentis infimis (latere

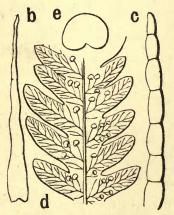




Fig. 105, Dryopteris membranoides HAYATA; a, the plant; b, a scale at the apex of the rhizome; c, a hair on the under side of the costa of a pinnule; d, a portion of a pinna; e, an indusium.

inferiore) longissimis a costa pinnæ angulo 80° egressis lanceolatis 8 cm. longis medio $2\frac{1}{2}$ cm. latis basi \pm contractis margine pinnatim lobulatis, lobulis lineari-oblongis longissimis $1\frac{1}{2}$ cm. longis 5 mm. latis apice obtusissimis, sinibus inter lobulos obtusis, margine integris. Textura tenuissime membranacea parcissime pubescens, pilis pluricellularibus, venis venulisque utraque pagine

a $X^{\frac{1}{5}}$

Fig. 106, Dryopteris nigrisquama HAYATA; a, the plant; b, a scale at the base of the stipe; c, a scale on the frond rhachis; d, a scale on a pinna; e, a hair on a pinna; f, basal portion of a pinna; g, middle portion of the same.

elevatis tenuissimis distincte visis subtus pilis dispersis. Indusium cordatum tenuissimum.

Hab. Urai: Rahao, leg. K. Miyake, Oct., 1899.

Near Lastrea melanopus (Hook.) (BEDD. Fern. Brit. Ind. t. 38), but differs from that by the far more larger fronds with bipinnatifid lowest pinna; also near Dictyopteris tenerifrons (Hook.) (BEDD. Fern. Brit. Ind. t. 4) and Pleocnemia membranifolium PRESL. (BEDD. Handb. Fern. Brit. Ind. p. 227, fig. n. 115), but differs from the latter by the longer fronds with castaneous scales.

Dryopteris (Eudryopteris)
morrisonensis Hayata Mater.
Fl. Formos. p. 450. Dryopteris
spinulosa O. Ktze. var. morrisonensis Hayata Mater. Fl. Formos.
p. 422.

Hab. Monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. Mori, 1906, Oct. (No. 2500). Dryopteris (Eudryopteris) nigrisquama Hayata sp. nov. (Fig. 106). Rhizoma? Stipes 30 cm. longus basi dense sursum sparce squamatus, squamis totis nigris inferioribus majoribus oblongis lanceolatis triangulari-lanceolatis usque 1½ cm. longis usque 4 mm. latis, superioribus minoribus apice lineariacuminatis basi truncatis vel tenuiter cordatis margine remote setosis vel

integris. Frons oblongo-lanceolata 37 cm. longa 18 cm. lata apice subito acuminata basi truncata pinnata, pinnis mediis et inferioribus longissimis a se 4 cm. longis angulo 70°–80° a rhachibus divaricatis lineari-lanceolatis sessilibus 10 cm. longis 1½ cm. latis apice acuminatis ad sunmum obtusis basi latissimis truncatis vel truncato-acutis margine grosse serratis, serris inferioribus 4 mm. latis 1 mm. longis ascendentibus!apice submucronatis pro-ximatis; pinnæ rectæ vel sursum plus minus falcatæ supra subglabræ, costis supra tenuiter impressis subtus elevatis, venis lateralibus a se 3–4 mm. remotis basi ramosis ramis liberis supra non visis subtus tenuiter visis; textura herbaceo-membranacea; pinnis suboppositis vèl alternis. Rhachis frondis minute squamata. Sori utroque latere

costæ pinnæ 2-3-seriatim vel sursum 1 - seriatim prope costas dispositi.

HAB. Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near D. decipiens, but differs from it by the shape of scales and pinnæ.

Dryopteris (Lastrea)
ochthodes C. Ch. (Fig.
107), Ind. p. 280. Lastrea
ochthodes (Kunze) Bedd.
Fern. South Ind. t. 106.

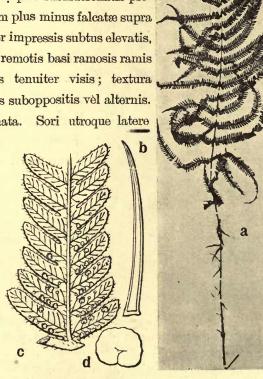


Fig. 107, Dryopteris (Lastrea) ochthodes C. Ch.; a, the plant; b, a hair on the costa of a pinna; c, portion of a pinnule; d, an indusium

Hab. Mt. Arisan: Funkiko, Jan., 1912, leg. B. Hayata et S. Sasaki.



b, a sorus

Compared with a Japanese specimen in the Tōkyō herbarium. This fern is extremely variable in the size of the fronds.

Dryopteris (Eudryopteris) pachyphylla HAYATA sp. nov. (Fig. 108). Rhizoma? Stipes 20 cm. longus squamatus stramineus, squamis lineari-lanceolatis usque 7 mm. longis usque 1 mm. latis longe acuminatis basi rotundatis plus minus cordatis vel subpeltatis margine parce breveque ciliolatis. Frons lanceolata stipite. multo longior 55 cm. longa 24 cm. lata apice cuspidato-acuminata medio deorsum æquilata basi plus minus angustior truncata pinnata, pinnis mediis longissimis a se 3 cm. remotis suboppositis vel alternis angulo recto divaricatis lineari-lanceolatis 15 cm. longis 25 mm. latis apice acuminatis basi truncatis sessilibus latissimis pinnatifidis versus basin circ. ad rhachin fissis, sursum



Fig. 108, Dryopteris pachyphylla HAYATA; a, the plant; c, a scale on the frond-rhachis; d, basal portion of a pinna;

prope rhachin fissis, segmentis inferioribus rectangularibus 14 mm. longis 5 mm. latis apice truncatis approximatis a costa pinnarum angulo 80° divaricatis margine. remote minuteque

serrulatis apice denticulatis. Textura coriacea pagina supra glabra nitida subtus pallidior glabra, rhachibus densiuscule squamatis, costis primariis supra canaliculatis, subtus elevatis squamis dispositis, costulis venisque utraque pagine non distinctis vix visis; pinnis inferioribus plus minus reflexis, pinnis superioribus gradatim ascendentibus. Sori utroque latere costæ segmentorum 1-seriatim a basi frondis sursum dispositi, prope apicem frondis desunt.

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan. 1912.

Near *D. polylepis*, but differs from it by the much thicker coriaceous fronds with ebony black scales.

Dryopteris (Eudryopteris) phæolepis HAYATA sp. nov. (Fig. 109). Polystichum phæolepis HAYATA in sched. Herb. Taihoku. Rhizoma ascendens apice dense squamatum. Stip's 35 cm. longus basi dense squamatus sursum glaber, squamis pyramidalilanceolatis 10 mm. longis 3 mm. latis apice acuminatissimis basi latissimis truncatis castaneis. Frons in ambitu pentagona 30-40 cm. longa totiusque lata apice acuminata basi in ambitu cordata tripinnata, pinnis infimis bipinnatis, pinnis superioribus pinnatis vel pinnatifidis, pinnis breve petiolatis, pinnis superioribus lanceolatis, pinnis infimis oblique triangularibus 20 cm. longis 16 cm. latis latere inferiore basi 14 cm. latis latere superiore basi 3 cm. latis apice acuminatis basi obtusis, pinnulis infimis ordinis primarii (latere inferiore) multo longioribus linearilanceolatis 14 cm. longis 28 mm. latis apice acuminatissimis basi obtusis pinnatis (latere inferiore latioribus quam latere superiore),

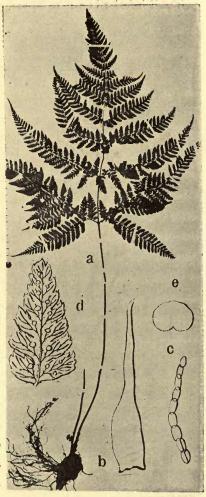


Fig. 109, Dryopteris pheolepis HAYATA; a, the plant; b, a scale on the rhizome; c, a hair on the lower surface of the fronds; d, a pinnule; e, an indusium.

pinnulis ordinis secundarii inferioribus lineari-oblongis 2 cm. longis 7 mm. latis apice obtusissimis basi acutis plus minus adnatis sessilibus margine lobulatis,

lobulis infimis 3 mm. longis $2\frac{1}{3}$ mm. latis oblique oblongis apice 2-3 aristatoserris instructis. Frons a medio sursum sorifera; pinnæ inferiores a rhachibus frondium angulo 50° egressis, pinnis a se 7 cm. remotis, pinnulis ordinis primarii inferioribus a se $2\frac{1}{2}$ cm. remotis, pinnulis ordinis secundarii inferiori-

Fig. 110, Dryopteris' (Meniscium) prolifera C. CE.; a, the plant; b, a scale on the rhizcme; c, a pinns.

bus a se 8 mm. remotis; textura herbaceocoriacea tenuis, costis pinnulæ supra tenuiter

> canaliculatis subtus elevatis, venis non visis; pagine supra glabra subtus pilis brevissimis parcissime obtecta. Sori utroque latere costæ pinnularum 1-seriatim dispositi.

> HAB. Mt. Arisan: inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Somewhat near Neph. recedens (Hook. Sp. Fil. t. 265); but differs from it by the scaly but not villose stipes and nearly glabrous fronds.

Dryopteris (Meniscium) prolifera C. Ch. (Fig. 110)Ind. p. 286. Polypodium proliferum Lowe Ex. Fern. Vol. II. t. 18.

Meniscium prolifera = Goniopteris prolifera

(PRESL.) BEDD. Fern. South, Ind. t. 172 et Handb. Fern. Brit. Ind. p. 296 fig. 153.

Hab. Satō, leg. H. Inaba, Juli., 1911; Holisha, leg. T. Sōma, 1911, Juli; Chikutōki, secus fossas crescens, leg. B. Hayata et Takeo Itō, Mart., 1914.

Dryopteris (Eudryopteris) pseudosieboldii HAYATA sp. nov. (Fig. 111).

Rhizoma? Stipes 35 cm. longus validus basi plus minus dilatatus minute muricatopunctatus basi dense squamatus sursum glabratus, squamis tenuibus lanceolatis ovatis usque 2 cm. longis 3–5 mm. latis apice filiforme acuminatis tenuissimis. Frons 40 cm. longa 30 cm. lata ovata apice in ambitu cuspidata basi in ambitu obtusa pinnata, pinnis totis æquiformibus æquilongis, pinna terminali lineari-lanceolata circ. 20 cm. longa 28 mm.lata apice acumi-

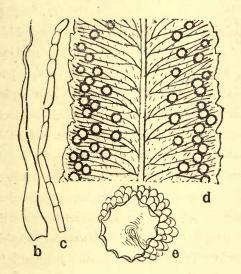




Fig. 111, Dryopteris pseudosieboldii Havata; a, the plant; b, a scale on the stipe; c, a hair on the lower surface of a pinna; d, portion of a pinna; e, a sorus.

nata (acumine lineari serrulato) basi obtusa margine tenuiter lobulata, lobulis inferioribus 3 mm. longis 6 mm. latis rotundatis subhorizontaliter sitis superioribus ad crenam reductis, sursum margine serrulato-denticulata, pinnis juxta terminalem paullo minoribus, pinnis inferioribus terminali æquilongis

margine crenulato-lobulatis, lobis minoribus serrulato-denticulatis, denticulis acutis; pinnis inferioribus a se 5 cm. remotis a rhachibus frondium angulo 60° egressis; pinnis lateralibus utroque latere rhachis 6 suboppositis, costis pinnarum supra leviter impressis subtus elevatis, venis lateralibus angulo 80° a costa egressis a basi ramosis a se 5 mm. remotis supra et subtus non elevatis tenuissimis distinctis; pagina coriacea supra glabra subtus plus minus pilis pluricellularibus parce dispersa a margine usque ad medium utrique lateris costæ sorifera supra viridissima subtus pallidior. Sori globosi 1½ mm. in diametro. Indusium cordatum margine undulatum sed integrum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near *D. Sieboldii*, but differs from it by the arrangement of sori which are scattered towards the margin, but not along the costa. It is still nearer to *D. podophylla* (Nat. Pfl.-fam. Pterid. p. 169 fig. 91, C et A), but distinguishable from it by the acutely serrulate margin of the fronds, by the subentire indusium and in the venation.

Dryopteris (Eudryopteris) quadripinnata HAYATA n. n. (Fig. 112). Microlepia quadripinnata HAYATA Mater. Fl. Formos. p. 434. Stipites 28 cm. longi basi pilosissimi (pilis crispatis depressis densis) etiamque basi squamati, squamis nigricantibus lanceolatis 4½ mm. longis 1½ mm. latis apice cuspidatis basi rotundatis extus glabris sub lente intus dense pilosis vel glabris, basi fuscentes a medio sursum stramineo-flavescentes subnitidi supra sulcati subteretes. Frondes late rhomboideo-triangulares 32 cm. longæ 40 cm. latæ apice acutæ vel acuminatæ basi acutæ vel obtusæ hirsutæ herbaceæ, partibus infimis quadri-pinnatis, inferioribus tri-pinnatis, superioribus bi-pinnatis, sursum simpliciter pinnatis, pinnis utroque latere rhachis frondis circ. 18 plus minus alternis, inferioribus circ. 6-7 cm. a se remotis subrectis apice ascendento-recurvatis a rhachibus angulo 60° divaricatis, pinnis infimis late triangularibus oppositis 22 cm. longis 20 cm. latis latere inferiore latioribus 12 cm. latis petiolatis (petiolis 2-3 cm. longis), pinnulis I. utroque latere 16 inferioribus 4 cm. a se remotis, infimis elongato-triangularibus 13 cm. longis 6 cm. latis apice acuminatis petiolulatis (petiolulis 1 cm. longis) remote pinnatis; pinnulis II. utroque latere 15, inferioribus a se 1-2 cm. remotis, infimis longissimis triangulari-lanceolatis 4½ cm. longis 2 cm. latis remote pinnatis; pinnulis III. utroque latere 6, inferioribus a se 7 mm. remotis ¡oblique ovatis apice

obtusis basi oblique cuneatis subsessilibus 1 cm. longis 8 mm. latis etiamque pinnatis vel pinnatifidis, segmentis inferioribus obliquis obovatis apice obtusis basi cuneatoattenuatis 4 mm. longis 2 mm. latis paucidentatis, (dentibus utroque latere 2-3), segmentis superioribus obovatis obliquis subunilateralibus dentatis vel integris; rhaches frondium complanatæ semi-teretes supra sulcatæ ad utrumque latus sulcorum dense hirsutæ cæterum glabræ subtus convexæ glabræ stramineæ; rhaches pinnarum supra leviter sulcatæ vel elevatæ sursum subalatæ supra dense hirsutæ subtus glabræ; rhaches pinnularum I. II. et III. complanatæ supra densissime

hirtellæ subtus glabræ, venis et venulis utrinque hirsutis; paginæ secus venas et venulas utraque hirsutæ, venulis apice furcatis, ramis superioribus brevioribus soriferis, ramis inferiorilongioribus non bus soriferis, interdum venulis simplicibus soriferis vel sterilibus, ramis prope apicem

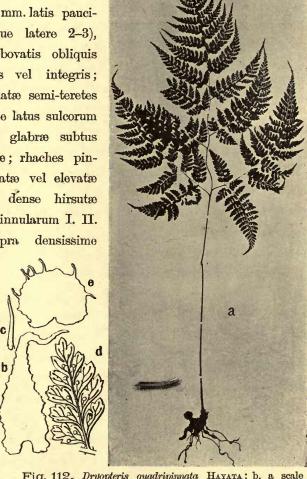


Fig. 112, Dryopteris quadripinuata HAYATA; b, a scale on the rhizome; c, unicellular hair on the upper side of a costa of a pinnule; d, a pinnule; e, an indusium.

evanescentibus. Sori sub quoque dente segmentorum vel venularum III. singuli ab apice dentum ½-1 mm. remoti ad apicem ramorum venularum terminales. Indusium late cordatum ½ mm. latum margine ciliatum.

Hab. Nantō: Mushazan, leg. T. Kawakami et U. Mori, 1906, Aug. (No. 2390); Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Very near D. (Aspidium) Miqueliana C. Ch., but differs from it by the ciliate indusium.

Dryopteris (Eudryopteris) reflexipinna HAYATA sp. nov. (Fig. 113)



Fig. 113, Dryopteris reflexipinna HAYATA; a, the plant; b, portion of a pinnule; c, a sorus.

Rhizoma? Stipes erectus 40 cm. longus glaber esquamatus stramineus rectus. Frons erecta triangularis 30 cm. longa latior quam longa circ. 40 cm. lata

apice in ambitu abrupte acuminata basi latissima quadripinnata, pinnis utroque latere 8-9, infimis longissimis superioribus gradatim brevioribus ad apicem ad dentem pinnæ terminalis reductis, inferioribus a se 5 cm. remotis, infimis 18 cm. longis triangularibus 10 cm. latis basi latere inferiore 7 cm. latis latere superiore 4 cm. latis apice acuminatissimis (acumine lineari) basi petiolatis (petiolis 2-3 cm. longis) pinnulis ordinis primarii infimis (latere inferiore) 8 cm. longis lanceolatis falcato-ascendenti-recurvis basi latissimis 3½ cm. latis apice acuminatissimis sub-æquilateralibus breve petiolulatis, pinnulis ordinis secundarii infimis (latere inferiore) oblique triangularibus 2 cm. longis $1\frac{1}{2}$ cm. latis apice obtusissimis basi subtruncatis breve petiolulatis; pinnulis ordinis tertii infimis (latere inferiore) oblique obovatis 1½ cm. lougis 4 mm. latis apice rotundato-obtusis basi cuneatis subsessilibus subunilateralibus 1-2-lobatis, lobis 2 mm. longis totiusque latis obtusissimis; pinnulis ordinis tertii infimis lateris superioris latioribus majoribus quam iis lateris inferioris. Rhachis frondis glaberrima valde flexuosa, rhachis pinnarum minus flexuosa sursum subalata complanata, rhachis pinnularum subrecta complanata subalata; pinnis inferioribus a se 6 cm. remotis, pinnulis ordinis primarii inferioribus a se 2 cm. remotis, pinnulis ordinis secundarii inferioribus a se 1 cm. remotis, pinnulis ordinis tertii inferioribus a se 5 cm. remotis, pinnis infimis a rhachibus frondium angulo 140°, pinnis superioribus angulo 90° divaricatis, pinnulis a rhachibus pinnarum angulo obtuso vel angulo recto divaricatis, pinnulis ordinis secundarii a rhachibus pinnularum ordinis primarii angulo 70° vel plus acuto divaricatis; frons textura tenuiter herbacea viridis, costis venis venulis supra obscure subtus distincte visis tenuissimis.

HAB. Rinkiho, leg. H. INABA, Oct. 1911; Mt. Arisan; Heishana, ad 7000 ped. alt., leg. B. HAYATA et TAKEO ITŌ, Mart., 1914.

When I first examined a herbarium specimen of this fern, I thought that it might have been a fern of scandent or pendulous habit, as the pinnæ and pinnule are always turning backwards and the rhachis is very flexuose. In my last excursion to the island, I found the fern, quite contrary to my expectation, standing erect or nearly so on the ground. It is very rare; I could find the fern but once in my journey through the mountains. Somewhat allied to D. Maximowiczii in its habit, sori and size, but greatly differs

from it by the reflexed pinnæ and quite obtuse apex of the lobes. Also resembles Lastrea undulata (Thwaites) (Bedd. Fern. South Ind. t. 271), but distinguishable from it by the less flexuose quite glabrous rhachis and stipes. The ramification of the fern is somewhat similar to that of Gymnogramme anfractuosa Christ (Farnkräuter der Erde p. 73, fig. 187).

Dryopteris (Eudryopteris) reflexosquamata Hayata sp. nov. (Fig. 114). Rhizoma? Stipes 20–30 cm. longus dense squamatus, squamis reflexis lanceolato-ovatis 9 mm. longis 2½ mm. latis apice acuminatissimis margine remote brevissimeque setoso-ciliatis. Frons oblonga vel oblongo-lanceolata

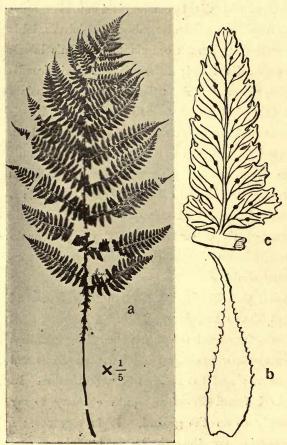


Fig. 114, Dryopteris reflexosquamata HAYATA; a, the plant; b, a scale of the stipe; c, a pinnule.

35-40 cm. longa medio latissima 20 cm. lata apice triangulari-acuta vel breve cuspidata basi rotundata bipinnata vel bipinnatifida, pinnis inferioribus a se 4 cm. remotis angulo 45° a rhachibus divaricatis, pinnis mediis longissimis lanceolatis 12 cm. longis 3½ cm. latis apice cuspidato-acuminatis basi plus minus contractis pinnatis, pinnulis inferioribus a se 6 mm. remotis a rhachibus angulo 80°-90° divaricatis linearilanceolatis, mediis longissimis 18 mm. longis basi latissimis 5-6 mm. latis apice obtusis basi abrupte cuneatis sessilibus a se 7 mm. remotis margine duplicatoserrulatis, serrulis obtusis

1½ mm. longis totiusque latis apice et margine serrulis setosis 2-3 instructis. Textura tenuiter coriacea, rhachibus frondium rectis dense squamatis; costis pinnæ supra profunde sulcatis supra glabris subtus parce squa-

matis, squamis linearibus minutis, costulis et venis venulis supra impressis subtus ± elevatis; pagina supra glabra subtus minute parceque squamata. Sori utroque latere costæ 1-seriatim dispositi.

HAB. Arisan ad 8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan. 1912.

Somewhat resembles Neph. Falconeri HOOK. Sp. Fil. t. 256, but differs from it by the far less scaly fronds.

Dryopteris (Phegopteris) remota HAYATA (Fig. 115) Mater Fl. Formos. p. 421. Stipites tenues 18 cm. longi 1 mm. in diametro glabri nitentes subteretes supra profunde sulcati straminei. Frondes stipite breviores ambitu triangulares apice acuminatæ basi latissimæ 12 cm. longæ a basi 16 cm. latæ apice pinnatæ medio bipinnatæ infime tripinnatæ, pinnis remotissime oppositis, a rhachibus angulo 70° divaricatis, inferioribus 3 cm. a se remotis, infimis longissimis a basi sursum



gradatim brevioribus; pinnis b, a scale on the rhizome; c, a pinnule.

infimis elongato-triangularibus 8 cm. longis a basi 3½ cm. latis petiolatis (petiolis 13 mm. longis) obliquis latere inferiore quam latere superiore latioribus, pinnulis I. inferioribus pinnatis a se circ. 1 cm. remotis superioribus pinnatifidis versus summum lobulatis, pinnulis I. infimis latere inferiore pin-



Fig. 116, Dryopteris serrato-dentata HAYATA; a, the plant; b, a scale on the stipe; c, a portion of a pinna.

narum 23 mm. longis 1 cm. latis sessilibus basi pinnatis medio pinnatifidis surlobulatis. sum (segmentis infimis angustatoquadrangularibus 6 mm. longis 11 mm. latis apice obtusis basi plus minus contractis vel ad rhachin adnatis divaricatis margine undulatointegris, undis utroque latere 3-4). Rhaches frondium semiteretes glabræ tenuissimæ susulcatæ pra subtus convexæ; rhaches pinnarum supra leviter sulcatæ glabræ; venis centralibus

segmentorum infimorum et venulis flexuosis, venulis simplicibus ad sinus undarum attingentibus utrinque planis sed distinctis glabris; paginæ membranaceæ utraque glabræ. Sori globosi circ. 3 mm. in diametro ad quasque venulas dorsaliter siti utroque latere venarum 1-seriatim 3-4 dispositi; receptaculum prope apicem venularum lineare. Indusium non visum verisimiliter obsoletum.

HAB. In monte Morrison, leg. G. NAKAHARA, 1905, Oct.; Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near Nephrodium Dryopteris, but differs from it in the arrangement of the pinnæ.

Dryopteris (Eudryopteris) serrato-dentata (Bedd.) Hayata n.n. (Fig. 116). Dryopteris Filix mas var. serrato-dentata Bedd.; Hayata Mater. Fl. Formos. p. 416. Lastrea odontoloma Moore Bedd. Handb, Fern. Brit. Ind. fig. 128.

Hab. In monte Morrison, ad 11000 ped. alt.

This is quite identical with the fern labelled as D. Flic mass var. serrato-dentata Bedd. in the herbarium at Kew. This fern is, however, so widely different from D. Filix mas in many points. It should better be regarded as specifically different from the type.

Dryopteris (Leptogramma) squamæstipes C. Ch. (Fig.117) Ind. p. 294. Phegopteris auriculata Bedd. Handb. Fer. Brit. Ind. p. 290 t. n. 149. Polypodium auriculatum (WALL.) Bedd. Fer. Brit. Ind. t. 203.

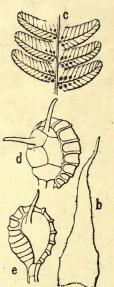




Fig. 117, Dryopteris (Leptogramma) squamosstipes C. Ch.; a, the plant; b, a scale on the stipe; c, a portion of a pinna; d, e, sporangia,

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Dryopteris (*Cyclosorus*) sophoroides O. Ktze. form. ensipinna, (Fig. 118).

HAB. Botansha, leg. K. MIYAKE, Jan. 1900.

This looks different from D. sophoroides, but the venation, sori and

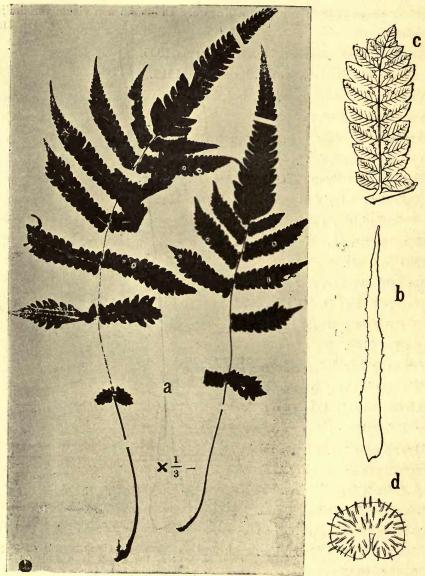


Fig. 118, Dryopteris (Cyclosorus) sophoroides O. Ktze.; a, the plant; b, a scale at the base of the stipe; d, an indusium.

scales are all very similar to those of the species, from which this may not be regarded as a distinct species nor even as a variety.

Dryopteris (Eudryopteris) subdecipiens HAYATA sp. nov. (Fig. 119).

Rhizoma suberectum apice dense squamatum, squamis ovato-lanceolatis nigris nitidis apice lineari-acuminatis plus 2 cm. longis 5 mm. latis. Stipes 30 cm. longus basi dense sursum parce squamatus, squamis inferioribus vel mediis linearibus 8 mm. longis basi 1 mm. latis subcordatis margine subintegris basi parce fimbriatis. Frons ovata 45 cm. longa 30 cm. lata apice cuspidata basi rotundata pinnata, pinnis mediis longissimis lineari-lanceolatis 15 cm. longis 3 cm. latis apice acuminatissimis basi late truncatis

sessilibus margine crenato-lobulatis sursum ad acumen serratis, lobulis rotundatis ascendentibus 5 mm. longis 7 mm. latis latere superiore 1-2-mucronatis, pinnis suboppositis a rhachibus angulo 80° divaricatis, inferioribus 3-4 cm. a se remotis versus apicem ± falcatis, costis supra impressis subtus

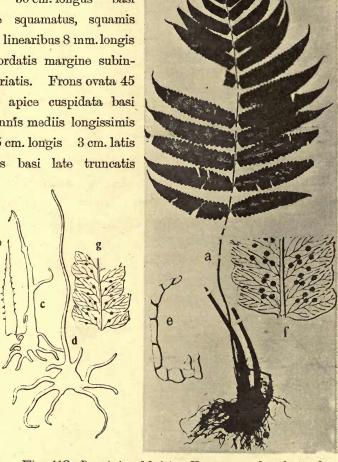


Fig. 119, Dryopteris subdecipiens HAYATA; a, the plant; b, a scale on the apical portion of the stipe; c, d, scales on the frond rhachis; e, a hair on the costule of a pinna; f, basal portion of a pinna; g, apical portion of the same.

elevatis, venis lateralibus a se circ. 6 mm. remotis a costa angulo 50° egressis

supra non visis subtus tenuiter visis distinctis a basi ramosis, ramis liberis. Textura herbaceo-membranacea. Sori secus costas multiseriatim dispositi prope marginem haud dispositi.



Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Near *D. decipiens* O. KTZE, and *D. nigrisquama* HAY., butd iffers from them by the much larger fronds, acutely truncated base of the pinnæ and by the scales on the rhachis which are long fimbriated at the base.

Dryopteris (Eudryopteris) subexaltata C. Ch. (Fig. 120); HAYATA Mater Fl. Formos. p. 418.

Hab. Liukiu: Nagodake, Aprili., 1907, leg. G. Nakahara.



Fig. 12O, Dryopteris (Eudryopteris) subexaltata C. Ch.; a, the plant; b, a scale on the rhizome; c, a pinna.

Dryopteris (*Lastrea*) sublaxa Hayata sp. nov. (Fig. 121). Rhizoma repens, radicibus filiformibus. Stipes parcissime squamatus 23 cm. longus

stramineus glaber laevis, squamis lanceolatis 1-2 mm. longis. Frons lineari-lanceolata apice acuminata basi truncata 25 cm. longa 7 cm. lata pinnata, pinnis a rhachibus angulo 70°-90° divaricatis, inferioribus a se 1½ cm. remotis alternis, superioribus gradatim brevioribus, inferioribus lineari-lanceolatis cm. longis 1 cm. latis apice acuminatis ad summum obtusis basi latissimis truncatis sessilibus latere superiore latioribus quam latere inferiore, pinnatifidis vel pinnatilobis, lobis latere superiore infimis 6 mm. longis 2½ mm. latis linearioblongis apice obtusissimis, lobis superioribus gradatim minoribus ± acutis margine integris. Textura tenuiter membranaceo-herbacea, costa et vena pinnarum supra elevata densissime pilosa, pilis unicellularibus, subtus elevata subglabra pilis glanduliferis pluri-cellularibus brevissimis parce instructa; rhachibus brevissime villosis tenuissimis; pagina margine adpresse ciliata. Sori utroque latere costulæ loborum vel utroque latere costæ pinnarum 1-seriatim dispositi.

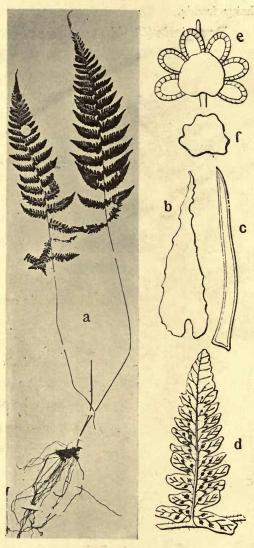


Fig. 121, Dryopteris (Lastrea) sublawa HAYATA; a, the plant; b, a scale on the rhizome; c, a hair on the costule of a pinna; d, a pinna; e, a sorus; f, an indusium with more crenate margin.

Indusium subcordatum margine integrum vel subcrenulatum.

HAB. Arisan, leg. B. HAYATA, 1912, Jan.

Near D. laxa, but differs from it by the not ciliate indusium and less hairy fronds.

Dryopteris (Ctenitis) tenuifrons HAYATA sp. nov. (Fig. 122). Rhizoma?



Stipes 40 cm. longus parce squamatus, squamis lanceolatis 4 mm. longis 1 mm. latis, sub lente pubescens. From longe triangularis 60 cm. longa 40 cm. lata apice triangulari-acuminata basi in ambitu obtriangulari-acuta inferiore bipinnata, pinnis inferioribus a se 8-10 cm. remotis a rhachibus 70°-90° divaricatis, pinnis infimis triangularibus 20 cm. longis basi totiusque latis apice triangulari-acutis breve petiolatis (petiolis 1 cm. longis) inæquilateralibus latere superiore 8 cm. latis, latere inferiore 14 cm. latis, pinnulis inferioribus a se 3 cm. remotis a costa pinnæ angulo 80°-90° divaricatis, pinnulis infimis (latere inferiore) longissimis superioribus gradatim brevioribus, infimis longissimis lineari-lanceolatis 14 cm. longis 3 cm. latis apice acuminatis basi truncatis latissimis breve petiolatis vel sessilibus pinnatifidis vel pinnatilobis, lobis lineari-oblongis 17 mm. longis 6 mm. latis apice obtusis

margine crenulatis, crenulis ± ascendentibus; stipites, rhaches costæque toto

scentes; frons

Fig. 122, Dryopteris tenuifrons HAYATA; a, the plant; b, a scale on the stipe; c, a hair on the costa of a pinnule; d, a portion of a pinna.

textura tenuissime herbaceo-membranacea supra plus minus pubescens, pilis

pluricellularibus. Sori utroque latere costulæ loborum prope marginem 1-seriatim dispositi.

Hab. Kötöshö, leg, T. Kawakami et S. Sasaki, Juli., 1912.

Dryopteris(Eudryopteris) thrichorhachis HAYATA sp. nov. (Fig. 123). Rhizoma? Stipes 70cm. longus basi dense sursum parce squamatus castaneo-rubescens. squamis inferioribus latioribus lanceolatis 1-2 cm. longis 2-4 mm. latis apice subula to-acuminatis castaneo-nigricantibus validiusculis patentibus, squamis superioribus angustioribus linearibus vel setiformibus patentissimis; rhachis straminea squamis setiformibus ubique dispersa, squamis persistentibus patentissimis. Fronsovatotriangularis 66 cm. longa 50-55 cm. lata apice tenuissime

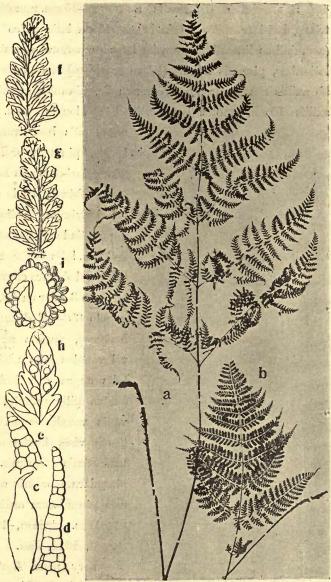


Fig. 123, Dryopteris thrichorhachis HAYATA; a, the type specimen; b, a younger specimen: c, a scale on the stipe; d, a hair on the upper side of a costa of a pinnule; e, a hair on the under side of a costa of the same pinnule; f, an upper pinnule from the younger specimen, seen from below; g, the same, seen from above; h, a second pinnule of the middle pinna; i, a sorus.

acuminata basi in ambitu obtusa tripinnata, pinnis inferioribus angulo 45° a rhachibus divaricatis a se 10-15 cm. remotis, infimis longissimis triangulari-lanceolatis 40 cm. longis 15 cm. latis apice tenuissime acuminatis (acuminibus linearibus serratis) latere superiore angustioribus latere inferiore latioribus, pinnulis infimis (latere superiore) lanceolatis 7 cm. longis 2 cm. latis, ab axillis rhachis frondis 2 cm. remotis, pinnulis infimis (latere inferiore) ab axillis 10 cm. remotis lanceolatis 12 cm. longis 3 cm. latis apice tenuissime



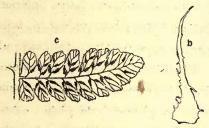
Fig. 124-A, Dryopteris (Leptogramma) africana C. Ch.; a, the plant.

acuminatis basi truncatis, petiolulis 3 mm. longis, pinnulis ordinis secundarii infimis triangulari-oblongis 18 mm. longis 1 cm. latis apice obtusis basi subtruncatis sessilibus vel brevissime petiolulatis pinnatifidis, segmentis longe rectangularibus 8 mm. longis 2-3 mm. latis apice rotundatis margine integris vel obscure crenulatis, pinnulis inferioribus a se 3 cm. remotis, a rhachibus pinnarum angulo 80°-90° divaricatis. Textura rigide herbacea, pagina supra pauce ad costulas vel venulas pilis setiformibus dispersa, costulis supra canaliculatis subtus elevatis, subtus pilis minutis tenuissimis dispersis, venis venulis supra non visis subtus distincte visis leviter elevatis pilis minutis tenuissimis dispersis. Sori versus apicem pinnularum ordinis secundarii vel segmentorum pinnularum ordinis secundarii siti.

Hab. Arisan, leg. B. HAYATA et S. SASAKI, 1912, Jan.

Very near Lastrea spectabilis Wall. (Bedd. Handb. Fer. Brit. Ind. p. 257, fig. 132=D. Hendersoni C. Ch.). The smaller, perhaps younger form in the accompanying figures above given accords pretty well with

BEDDOME's figures, save the position of the sori which are in our specimens all located only towards the apex of the pinnules or of the segments of the latter. I am hesitating to regard this fern as distinct from L. spectabilis.



Dryopteris (Leptogramma) africana (Desv.) (Fig. 124, A-B.) C. Ch. Ind. 251. Nephrodium Totta Diels.

HAB. Arisan, leg. B. HAYATA et S.

Sasaki, Jan., 1912. Compared with

Fig. 124-B, Dryopteris africana C. a specimen so la-Ch.; b, a scale on the rhizome; c, a pinna. belled in the Tökyö herbarium. I am merely following C. Christensen's

Index in taking D. africana for this fern.

Dryopteris (Eudryopteris) transmorrisonensis

HAYATA n. n. Polystichum transmorrisonense HAYATA

Mater. Fl. Formos. p. 427.

Hab. In monte Morrison, ad 12000 ped. alt., leg. T. KAWAKAMI et U. Mori, Oct., 1906, (No. 2502).

Paper Bryopteris (Eudryopteris)

Yabei Hayata (Fig. 125), Mater.

Fl. Formos. p. 424. Stipites rubescentes 30 cm. longi basi squamati (squamis linearibus nigricantibus 1-1½ cm. longis vel brevioribus rubescentibus) supra bisulcati basi 4 mm. lati ad totam longitudinem parcissime muricati.

Frons in circumscriptione ovata 45 cm. longa 30 cm. lata apice cuspidata basi obtusa subglabra coriacea bipinnata, partibus infimis rarius subtripinnatis, pinnis mediis angus-

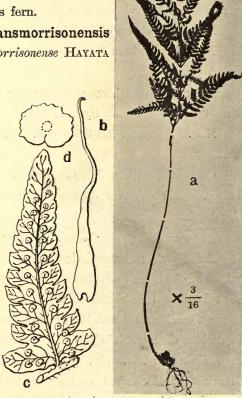


Fig. 125, Dryopteris Yabei HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule; d, a sorus.

tato-lanceolatis 15 cm. longis basi latissimis 5 cm. latis apice acuminatis plus minus petiolatis, pinnis infimis conformibus longioribus latissimis, pinnis utroque latere rhachis frondis 15–16 inferioribus 5 cm. a se remotis, pinnis basi pinnatis sursum pinnatifidis, (segmentis falcato-recurvis apice acutis mediocribus 1½ cm. longis 4 mm. latis a basi contractis vel plus minus dilatatis margine obscure dentatis vel distincte dentatis); pagina supra viridis subtus pallidissime plus minus rubescens utraque glabra. Rhachis frondis supra bi-tri-sulcata piloso-squamata, squamis densiusculis rubris, subtus convexa minute parcissime muricata; rhachis pinnarum complanata supra plano-sulcata glabra subtus elevata squamata, venis et venulis liberis. Sori secus venas loborum pinnarum vel pinnularum sub quoque dente siti ab apice dentium 2 mm. remoti, vel sursum ad sinus dentium siti. Indusium persistens orbiculari-cordatum 1½ mm. in diametro rubrum margine paucissime eroso-ciliolatum.

HAB. Kusshaku et Shintengai, leg. K. MIYAKE, 1899.

Near Nephrodium acutum Hook., but differs from it by the shape of the lowest pinna.

Dryopteris viridescens (Baker) O. Ktze.; C. Ch. Ind. p. 300. Nephrodium viridescens Baker Syn. p. 275.

Hab. Arisan, 7000–8000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Compared with a Japanese specimen so labelled in the herbarium at Tōkyō. This common Japanese fern is found in Formosa only in high elevations.

Aspidium Sw.

Aspidium submembranaceum Hayata sp. nov. (Fig. 126). Rhizoma? Stipes 30 cm. longus nitidus basi purpureo-nigrescens vel atro-castaneus sursum ± rubescens basi densissime squamatus, squamis linearibus rubro-castaneis usque 2 cm. longis 1 mm. latis margine remote ciliatis vel non ciliatis. Frons in ambitu ovato-cordata 30 cm. longa 18 cm. lata bipinnata apice acuta basi in ambitu cordata, pinnis oppositis a rhachibus frondis angulo 70°–80° divaricatis, inferioribus a se 5 cm. remotis, infimis triangularibus arcuatis inæquilateralibus 16 cm. longis 13 cm. latis, latere suqeriore basi 4 cm. latis, latere inferiore latioribus basi 9 cm. latis apice arcuato-acuminatis basi latis-

simis truncatis pinnatis pinnulis infimis latere superiore ab axillis 7 mm. distantibus 4 cm. longis, pinnulis infimis (latere inferiore) ab axillis 2 cm. remotis 10 cm. longis 3 cm. latis apice acuminatis lanceolatis basi truncatis sessilibus



Fig. 126, Aspidium submembranaceum HAYATA; a, a pinnule, ×2.

usque ad ² pinnatifidis, (rhachibus 6 mm. latis), segmentis rectangularibus apice obtusis 11 mm. longis 5 mm. latis margine denticulatis; venis anastomosantibus, areolis costalibus linearibus angustissimis; pagina membranacea in exsiccato rubescens utraque pilis minutis brevissimis parcissime dispersa, costulis venis venulisque supra elevatis distincte visis subtus subplanis; inter segmenta vel lobos pinnularum dentibus minutis ½ mm. longis sitis. Sori prope

apicem vel prope marginem loborum vel segmentorum siti.

Hab. Urai, leg. B. Hayata et S. Sasaki, Juli., 1912.

Very near Dictyopteris chattagrammica Bedd. (Aspidium membranifolium Ktze.),

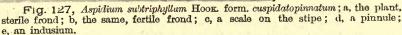
BEDD. Handb. Fern. Brit. Ind. p. 300, fig. 155.

Aspidium subtriphyllum Hook. form. cuspidatopinnatum (Fig. 127).

Hab. Prope Botansha, leg. K. MiyaKE, Jan., 1900.
This fern is extremely variable. Our specimens here figured are so widely different from

the type of





A. subtriphyllum that it should otherwise claim to be a distinct species.

Polystichum Roth.

Polystichum aculeatum Roth.; Hayata et Matsum. Enum. Pl. Formos. p. 581.

Hab. Mt. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan.

Polystichum atroviridissimum Hayata sp. nov. (Fig. 128). Rhizoma erectum. Stipes 25 cm. longus basi spathulato-dilatatus squamatus, squamis

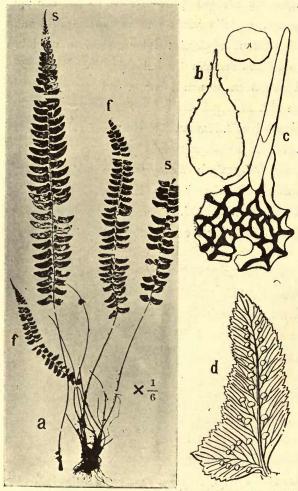


Fig. 128, Polystichum atroviridissimum Hayata; a, the plant, s=sterile fronds, f=fertile fronds; b, a scale on the rhizome; c, a scale on the lower surface of a pinna; d, a pinna; e, a sorus.

inferioribus linearibus superioribus ovatis paleaceis apice cuspidatoacuminatis basi rotundatis 7 mm. longis 3 mm. latis margine remotissime setulosis. Frons sterilis longe lineari-lanceolata 40-50 cm. longa 6-7 cm. lata medio latissima basi minus lata apice acuminatissima, acuminibus linearibus, pinnis mediis a se 13 mm. remotis longissimis sursum minoribus ad dentes 3 mm. longos reductis, pinnis fere horizontaliter patentibus, mediis 34 cm. longis 14 cm. latis oblique lanceolatis plus minus falcatis apice aristato-acutis basi oblique truncatis latere superiore latissimis basi auriculatotruncatis (auriculis 1 cm. longis cum rhachibus

parallelis), basi inferiore cuneato-acutis sessilibus vel brevissime petiolatis margine aristato-serrulatis; rhachis supra sulcata tenuis squamata, costis venis pinnæ tenuissimis utraque pagine elevatis distinctis; pagina supra nitida atro-

viridissima glabra subtus regulariter secus venas venulas costulasque squamis minutis obtecta, squamis persistentibus subribris 10 mm. latis cuspidato-rotundatis denticulatis basi cordatis; textura tenuiter coriacea. Frons fertilis quam sterili minora lanceolata 30 cm. longa 4-5 cm. lata subtus soris utroque latere costæ fere uniseriatim dense instructa. Pinnæ steriles et fertiles margine tenuiter albo-marginatæ. Indusium peltatim rotundatum margine irregulariter crenatointegrum 14 mm. in diametro.

Hab. In monte Arisan, ad 8000-7000 ped. alt., leg. B. Hayata et S. Sasaki, 1912, Jan.

Polystichum constantissimum Hayata sp. nov. (Fig. 129). Dryopteris constantissima Hayata in sched Herb. Taihoku. Rhizoma? Stipes 30 cm. longus fusco-stramineus basi squamatus, squamis nigricantibus, in magnitudine variabilibus majoribus lanceolatis linearibus vel ovatis acuminatissimis basi auriculatocordatis vel truncatis 6-7 mm.

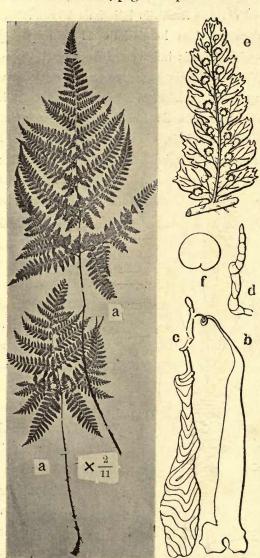


Fig. 129, Polystichum constantissimum HAYATA; a, the plant; b, a scale at the base of the stipe; c, one of the smallest scales on the stipe; d, a hair on the under surface of the frond; e, a pinna; f, an indusium.

longis, minoribus 1½ mm. longis. Frons in ambitu cordata apice acuminata basi cordata tripinnata 35 cm. longa 20–23 cm. lata, pinnis infimis longissimis 16 cm. longis breve petiolatis oblique cuspidato-triangularibus apice acuminatis basi oblique truncatis latissimis 13 cm. latis, (pinnulis infimis ordinis primarii latere inferiore longissimis 11 cm. longis, iis infimis latere superiore 3 cm. longis) pinnulis infimis ordinis primarii latere inferiore 11 cm. longis 3 cm. latis apice acuminatis basi plus minus rotundatis sessilibus, pinnulis infimis latere superiore 3 cm. longis triangulari-ovatis apice obtusis basi truncato-cuneatis sessilibus, pinnulis infimis ordinis secundarii triangulari-oblongis sessilibus margine lobulatis, lobis ascendento-patentibus infimis oblongis 4 mm. longis 2½-3 mm. latis margine remote aristato-serrulatis; pagina subtus toto (exceptis pin-

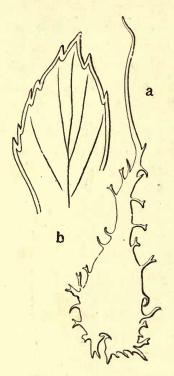


Fig. 13O, Polystichum falcatipinnum HAYATA; a, one of the smallest scales on the stipes; b, a portion of a pinnule,

nulis inferioribus pinnarum infimarum) sorifera; rhachis frondis et pinnarum supra profunde sulcata superiore anguste canaliculata squamata, costulis pinnularum supra canaliculatis subtus elevatis, venis lateralibus supra non visis subtus plus minus visis; pagina coriacea margine aristata supra glabra subtus minute pilosa, pilis minute ½ mm. longis, squamis ad rhachin pinnarum vel pinnularum basi sacciferis.

Hab. Monte Arisan, leg. B. Hayata et S. Sasaki, 1912, Jan.

Near P. varium Pr.; but differs from it by the very much unequal sided lowest pinnæ with the longer lowest pinnules on the lower side, which pinnules are as twice long as the next pinnules.

Polystichum falcatipinnum Hayata sp. nov. (Fig. 130). Rhizoma erecto-ascendens cum reliquis stipitum 5 cm. in diametro. Stipes 20 cm. longus frondibus brevior, squamis variabillimis linearibus vel lanceolatis latioribus vel angustioribus, majoribus 1½ cm. longis 4–5 mm. latis apice cuspidatis, minoribus lanceolatis cus-

pidatis 2 mm. longis 1 mm. latis margine ciliatis. Frons lanceolata 40-60 cm. longa 10 cm. lata apice acuminatissima medio latissima basi minus lata 6 cm. lata pinnata, pinnis mediis longissimis deorsum paullo brevioribus sursum gradatim brevioribus in acumine ad dentem reductis, pinnis mediis longissimis 6 cm. longis 2 cm. latis lanceolatis apice aristato-acuminatis basi latissimis brevissime petiolatis (petiolis 2 mm. longis) pinnatifidis, basi latere superiore latioribus auriculato-truncatis, basi latere inferiore cuneatoacutis, deorsum pinnatifidis, pinnulis latere superiore basilaribus auriculiformibus 13 mm. longis 6-7 mm. latis oblique ovatis apice in ambitu obtusis margine aristato-serrulatis sed latere inferiore integris, pinnulis vel lobis juxta lobum infimum valde minoribus sursum ad dentem reductis (dentibus aristatis), margine tenuiter cartilagineo-albo-marginatis. Sori utroque latere costæ 1-seriatim dispositi; rhachis frondis squamata, squamis linearibus; costa pinnæ supra canaliculata subtus leviter elevata, venis supra non visis subtus tenuiter distinctis; pagina coriacea supra nitida viridissima subtus glauca supra parce squamis minutis dispersa, subtus secus venas venulas regulariter squamata, squamis minutis cuspidato-ovatis 10 mm. latis.

Hab. Arisan, ad 7-8000 ped. alt., leg. B. HAYATA et S. SASAKI, 1912, Jan. Polystichum globisorum HAYATA sp. nov. (Fig. 131). Rhizoma erectoascendens, apice cum reliquis stipitum 3 cm. in diametro. Stipes 50 cm. longus basi densissime squamatus, squamis fulvo-castaneis longe filiformilinearibus 1 cm. vel plus longis 1-1 mm. latis apice filiformibus basi oblique cordatis vel truncatis margine remote obscure setulosis vel subintegris, superiore subglabratus cum rhachibus stramineo-rubescens. Frons in ambitu cordato-pentagona 50 cm. longa 43 cm. lata apice ambitu triangulari-acuta subito-acuminata basi ambitu cordata quadripinnatifida, pinnis infimis longissimis tripinnatifidis 30 cm. longis 23 cm. latis subtriangularibus basi latissimis, apice acuminatis (petiolis 2 cm. longis), pinnulis infimis latere inferiore longissimis ea altera multo longioribus 18 cm. longis 6-7 cm. latis pyramidalilanceolatis apice acuminatis (acuminibus linearibus serrulatis) basi latissimis (petiolulis 1 cm. longis), pinnulis ordinis secundarii infimis (latere inferiore) longissimis triangulari-oblongis 4½ cm. longis 1½ cm. latis apice acutis basi obliquis (petiolulis 2-3 mm. longis) pinnatifidis, segmentis infimis (latere superiore) longissimis rhomboideo-ovatis 1½ cm. longis 7 mm. latis apice aristatoacutis basi oblique cuneatis margine serratis vel duplicato-serratis, serris apice aristatis tenuiter cartilagineo-marginatis, segmentis pinnularum ordinis secundarii sursum ad dentem reductis; pinnis inferioribus a se

b $\times \frac{3}{19}$ a

Fig. 131, Polystichum globisorum HAYATA; a, the plant; b, a scale on the rhizome; c, a pinnule; d, margin of the same; e, an indusium.

10-5 cm. remotis, superioribus gradatim reductis, pinnulis ordinis primarii pinnæ infimæ a se 4 cm. remotis, pinnulis ordinis secundarii inferioribus a se 2 cm. remotis; pagina supra viridissima nitida glabra subtus glabrata vel paucissime squamata, squamis minutis linearibus; textura tenuiter coriacea; pinnis a rhachibus frondis, pinnulis a rhachibus angulo 45° pinnæ divaricatis, sed pinnulis infimis a rhachibus pinnæ angulo recto divaricatis; rhaches frondes et pinnæ supra profunde sulcatæ sursum canaliculatæ, latere canaliculorum costulatoelevatæ, costulis

pinnularum ordinis secundarii supra canaliculatis, venis lateralibus supra impressis vel non visis infra plus minus distinctis. Sori ad totam paginam (exceptis apicibus pinnæ et pinnulæ) utroque latere costulæ 1-seriatim dispositi globoso-cordati 1½ mm. in diametro globoso-elevati. Indusium rotundato-cordatum margine denticulatum.

Hab. Arisan, ad 7000-8000 ped. alt., leg. B. Hayata et S. Sasaki, 1912, Jan.

Near P. laserpitifolium, but differs from it by the far much larger fronds with reflexed basal pinnules.

Polystichum horridipinnum Hayata sp. nov. (Fig. 132). Rhizoma erectum vel ascendens cum reliquis stipitum 3 cm. in diametro sectionis apice frondes cæspitosim gerens. Stipes 4 cm. longus dense squamatus, squamis in magnitudine variabillimis 3 mm.-10 mm. longis cuspidato-ovatis usque ad lanceolatis apice acuminatis crispato-recurvis basi ad insertionem minute cordatis minute

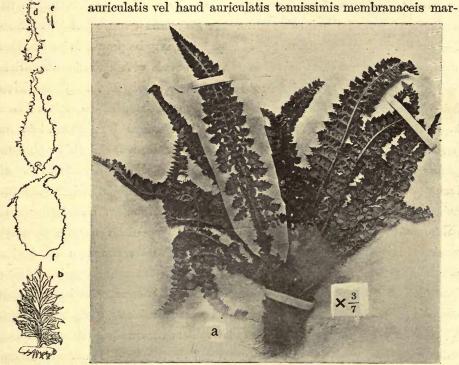


Fig. 132, Polystichum horridipinnum HAYATA; a, the plant; b, a pinna; c, d, f, various kinds of scales on the rhizome, stipe or rhachis; e, scales on the lower surface of the frond.

gine irregulariter ciliato-serrulatis vel denticulatis. Frons lanceolata 15 cm. longa 3 cm. lata apice aristato-acuminata basi latissima truncata pinnata, pinnis infimis longissimis superioribus gradatim minoribus, inferioribus a se ad insertionem 1 cm. remotis vix vel haud imbricatis pinnatifidis, infimis triangulari-oblongis vel lanceolatis 2 cm. longis 12 mm. latis apice aristato-acutis basi truncatis latissimis sessilibus pinnatifidis obliquis latere superiore latioribus, segmentis infimis oblique rotundato-ovatis apice aristato-triangulari-acutis basi cuneatis margine 1–2 dentibus aristatis instructis, aristis validis 1–½ mm. longis. Textura valde crasso-coriacea, pagina supra nitida glabra viridissima subtus pallida parce squamata, squamis interdum piliformibus erispatis. Rhachis frondis supra latiuscule sulcata, inferiore subtus ± squamata, superiore glabra supra toto glabra, costis et venis pinnarum supra impressis subtus subimpressis distincte visis. Frons a medio usque ad apicem sorifera.

HAB. Montibus centralibus, leg. U. Mori, 1909, Dec.

Near Aspidium Lonchitis (Lowe Brit. Exot. Fern, VI. t. 22) in the outline and size of the fronds; still nearer Polystichum ilicifolium Don (Bedd. Fern. Brit. Ind. p. 206, fig. n. 103). The latter may be proved to be identical with our fern, when close examination will be made with herbarium-materials.

Polystichum integripinnum Hayata sp. nov. (Fig. 133) = Aspidium integripinnum Hayata. Rhizoma? Stipes? Frons pyramidali-lanceolata 73 cm. longa infra medium latissima 30 cm. lata basi minus lata 25 cm. lata superiore angustior apice subito acuminata (acumine lineari) simpliciter pinnata, pinnis inferioribus longissimis 7 cm. a se remotis angulo 45° divaricatis lineari-lanceolatis circ. 20 cm. longis 24 mm. latis apice acuminatis basi ± latioribus subito acutis sessilibus obliquis latere superiore latioribus basi leviter auriculiforme dilatatis margine integris vel obscure undulatis sursum serrulatis rectis, pinnis superioribus gradatim minoribus versus summum ad dentem abeuntibus ± falcatis. Rhachis frondis recta squamata, squamis oblongolanceolatis lanceolatis 2-6 mm. longis apice cuspidatis acuminatis basi profunde cordatis (lobis cordis imbricatis) margine fimbriato-ciliolatis, costa pinnæ supra tenuiter impressa subtus elevata, venis lateralibus utraque pagine non visis vel subtus vix visis, venis lateralibus a costa 45° divaricatis 4-5 mm. a se remotis ramosis versus marginem anastomosantibus areolas formantibus, areolis cum

venulis liberis; pagina frondis supra glabra subtus ad costam et ad paginam squamata, squamis costæ ea rhachis subsimilibus, squamis paginæ amæboi-

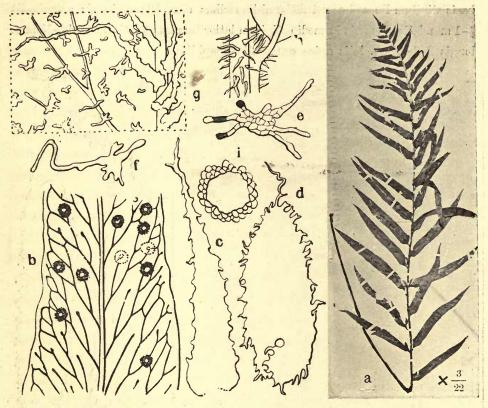


Fig. 133, Polystichum integripinnum HAYATA; a, the plant; b, a portion of a pinna; c, a scale on the stipe; d, a scale on the rhachis of the frond; e, f, scales on the under surface of a pinna; g, a portion of the under surface of a pinna; h, a portion of the rhachis; i, a sorus.

deis multiradiatis in forma variabillimis. Textura herbaceo-coriacea. Sori a medio sursum frondis irregulariter dispositi.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Most near Aspidium caducum Wall. (Hook. et Grev. Ic. Fil. t. 171); but differs from it by the much longer fronds with nearly entire narrower pinnæ. The fern is as well referable to Aspidium as to Polystichum. Also somewhat resembles Polystichum lonchitoides (Christ) Diels (Herb. Corea. tested by Dr. T. Nakal), but differs from it by the not auricled pinnæ with entire margin.

Polystichum prionolepis HAYATA sp. nov. (Fig. 134). Rhizoma erecto-

ascendens. Stipes 20 cm. longus frondem æquans basi densissime squamatus superiore minus dense squamatus, squamis castaneis dimorphis, squamis basis stipitum linearibus vel filiformi-linearibus circ. 12 mm. longis acuminatis $\frac{1}{4}$ -1 mm. latis, squamis in medio stipitum latioribus lanceolatis ovatis 12–15 mm. longis 2–3–4 mm. latis apice cuspidatis (cuspidibus

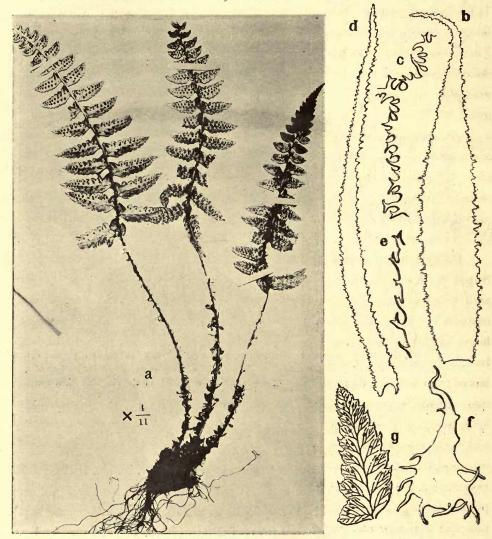


Fig. 134, Polystichum prionolepis HANATA; a, the plant; b, a scale on the stipe; c, the margin of the same; d, a scale on the rhachis; e, margin of the same; f, a scale on the lower surface of a pinna; g, a pinna.

filiformibus), generaliter squamis linearibus et ovatis intermixtis. Frons lanceolato-triangularis vel lanceolata in longitudine stipitem æquans 15–18 cm. longa 7–8 cm. lata apice acuminata basi latissima truncata pinnata, pinnis utroque latere circ. 16 a rhachibus frondis angulo recto divaricatis, pinnis infimis plus minus retrorsum reflexis longissimis 4 cm. longis 1 cm. latis a se 1½ cm. remotis oblique lanceolatis sessilibus apice aristato-acutis basi obliquis latere superiore recto-auriculatis, (auriculis vel dentibus infimis 8 mm. longis 7 mm. latis) latere inferiore cuneato-acutis margine grosse serrato-dentatis, dentibus subrotundatis aristato-apiculatis margine serrulatis superioribus gradatim minoribus ad serrulam simplicem reductis, pinnis superioribus gradatim minoribus castaneis; pagina frondis valde coriacea supra nitida glabra ad costam impressa minute fugacio-hirtellata subtus plus minus glauca minute pauceque squamifera. Sori utroque latere costa 1- vel 2-seriatim dispositi.

Hab. Arisan, ad 8000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912. Semewhat near *P. cospitosum* Wall. (Hook. Sp. Fil. t. 213).

Polystichum rectipinnum HAYATA sp. nov. (Fig. 135). Rhizoma? Stipes 25-30 cm. longus toto densiuscule squamatus, squamis in forma variabilibus linearibus vel lanceolatis ovatis margine ciliato-denticulatis apice cuspidatis, iis ovatis 1 cm. longis 3 mm. latis castaneis. Frons sterilis lanceolato-triangularis vel lanceolata 35 cm. longa 15 cm. lata apice acuta basi subtruncata pinnata, pinnis inferioribus longissimis 8-9 cm. longis lanceolatis 8-9 cm. longis 21 cm. latis sessilibus apice acuminatis basi oblique truncatis pinnatifidis vel inferiore pinnatis, pinnulis vel segmentis vel lobis infimis (latere superiore) maximis 10-12 mm. longis quadrangularibus 6 mm. latis valde obliquis latere superiore latioribus apice apiculato-aristato-acutis margine obscure crenatis vel subintegris, lobis superioribus minoribus brevioribus sursum ad dentem reductis, dentibus ascendentibus aristato-apiculatis; pinnis infimis retrorsum reflexis, mediis horizontaliter patentibus sursum plus minus descendentibus gradatim minoribus ad dentem reductis, inferioribus 1-2 cm. a se remotis subalternis; rhachis frondis supra sulcata squamata, squamis linearibus; costa pinnarum supra sulcata subtus elevata, venis lateralibus supra non visis subtus plus minus elevatis distinctis; pagina coriacea. Frons fertilis quam eis sterilibus multo angustior lanceolato-pyramidalis quam stipite in longitudine brevior 25 cm. longa basi latissima 13 cm. lata pinnata, pinnis totis horizontaliter patentibus vel plus minus retrorsum reflexis, inferioribus 3 cm. a se remotis, superioribus minoribus sursum ad dentem reductis, infimis longissimis lanceolatis 6-7 cm. longis 23 mm. latis apice



acuminatis basi oblique truncatis sessilibus pinnatis vel pinnati-fidis, pinnulis infimis latere superioribus longissimis cum rhachibus frondium parallelis oblongo-lanceolatis 12 mm. longis 4-5 mm. latis apice aristatoapiculatis basi oblique auriculato-truncatis latere superiore valde latioribus margine obscure denticulatis vel subintegris. Pagina supra viridissima plus minus squamis linearibus instructa, subtus dense sorifera squamata. Sori utroque latere costulæ pinnularum uni-seriatim a basi frondis usque ad apicem dense dispositi.

HAB. Arisan, ad 7000-8000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

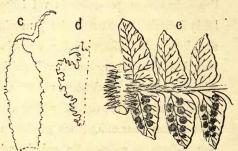


Fig. 135, Polystichum rectipinnum HAYATA; a, a sterile frond; b, fertile fronds; c, a scale of the stipe; d, margin of the same; e, a portion of a pinna.

Polystichum Tsus-Simene J. Sw. Compared with a Japanese specimen in the Tōkyō herbarium.

Hab. Arisan: prope Senninbora, leg. B. Hayata et T. Itō, Mart., 1914.

Gymnopteris Bernh.

Gymnopteris dichotomophlebia Hayata sp. nov. (Fig. 136). Rhizoma repens 2–3 mm. in diametro squamis dense obtectum, squamis cordato-ovatis apice obtusis vel acutis 2–3 mm. longis basi alte cordatis (lobis cordis profunde imbricatis) apice obtusis vel acuminatis. Stipes cum rhizomate continuus haud articulatus. Frons sterilis cum stipitibus lanceolata vel elliptico-lanceolata 20–25 cm. longa 3–3½ cm. lata apice triangulari-obtusa basi gradatim angustata

attenuata ad stipitem brevissimum 3-4 mm. longum abeuns margine integra membranacea in exsiccato pellucida distincte venosa, costis tenuibus utraque pagine distincte elevatis, venis lateralibus plerumque dichotome ramosis

reticulato - anastomosanti - bus (areolis costalibus subtriangularibus 7-8 mm. longis venulam liberam singulam furcato-ramosam includentibus), venis venulisque utraque pagine distincte elevatis tenuibus; pagina membranaceo-chartacea margine integra vel sensim repanda. Frons fertilis longe stipitata, stipitibus tenuibus fronde aequilongis 27 cm. longis

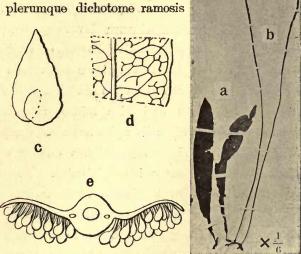


Fig. 136, Gymnopteris dichotomophlebia HAYATA; a sterile fronds of the plant; b, fertile fronds; c, a scale on the rhizome; d, portion of a sterile frond; e, cross section of a fertile frond.

glabris subcomplanatis $1\frac{1}{2}$ mm. in diametro. Lamina angustissime linearis stipitem æquans vel brevior 23 cm. longa $3-3\frac{1}{2}$ mm. lata apice acuminata basi gradatim attenuata ad stipitem abeuns supra glabra, costa elevata, margine integra leviter desuper recurva subtus toto sorifera; paraphyses lineares apice plus minus clavatæ.

HAB. Hainan, leg. Z. KATSUMADA, 1911.

Leptochilus dichotomophlebia HAYATA in sched. herb. Taihoku.

Near Gymnopteris variabilis (BEDD. Fern. Brit. Ind. t. 272 and Handb. Fern. Brit. Ind. p. 429, fig. 258), but differs from that by the lanceolate sterile fronds which are in our species much obtuse at the apex and are gradually attenuated towards the base, and by the very short stipes; also near Gymnopteris Feei Moore (BEDD. Fern. South Ind. t. 48), but differs from it by the linear fertile fronds. Lateral veins in our fern are nearly feathery towards the apex, but usually dichotomously branched downwards. Whether the stipes are articulated to the rhizomes or not is very questionable. There are seen faint lines, in which they are articulated, at the very base of the stipes. The lines, however, are not clear so as to decide the existence of articulation by themselves.

Nephrolepis Schott.

Nephrolepis tenuissimum HAYATA sp. nov. (Fig. 137). Rhizoma ascendens vel subrepens densiuscule foliosum, cum reliquis stipitum 1½ cm. in diametro. Stipes basi dilatatus nigricans supra basin sursum castaneo-stramineus basi densiuscule squamatus sursum gradatim glabratus, (squamis nigro-castaneis triangulari-lanceolatis basi plus minus rotundatis margine integris vel obscure remote dentiusculis apice acuminatis usque 3-4 mm. longis 1-1 mm. latis) usque 10 cm. longus gracillimus erectus supra profunde sulcatus plus minus minute pilosus vel subglabratus. Frons lanceolata usque 20 cm. longa 5 cm. lata apice tenuissime attenuato-acuminata (acuminibus linearibus) basi leviter angustior simpliciter pinnata, pinnis mediis horizontaliter patentibus longissimis a se 1 cm. remotis 22 mm. longis 6 mm. latis oblique oblongo-linearibus apice obtusis basi latere superiore auriculato-productis (auricula triangulari-oblonga latere interiore 8 mm. longa latere exteriore 4 mm, longa apice rotundata basi latissima 4 mm, lata margine obscure denticulata) basi latere inferiore cuneato-acutis breve petiolatis (petiolo 1 mm. longo) margine obtuse remoteque obscure serrulatis, pinnis inferioribus plus minus reflexis plus minus gradatim brevioribus, infimis 18 mm. longis, superioribus gradatim brevioribus plus minus ascendentibus versus summum ad dentes 3 mm. longos abeuntibus; rhachis frondis glanduloso-hirsuta, pilis unicellularibus brevissimis apice plus minus clavatis, supra canaliculata, petiolis pinnarum supra canaliculatis cum rhachibus frondium articulatis; textura membranacea ad marginem valde tenuissima, costis venis venulis utraque pagine planis subtus leviter elevatis distincte visis parce pilis glandularibus uni-

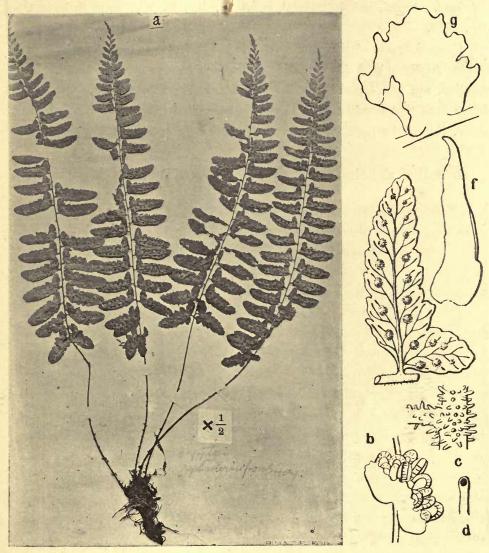


Fig. 137, Nephrolepis tenuissima HAYATA; a, the plant; f, a scale on the rhizome; c, a part of a rhachis with a petiole; d, a glandular hair on the same; e, a pinna; b, a sorus; g, an indusium.

cellularibus instructis; pagina supra fusco-viridis subtus pallidior. Sori medio inter costam et marginem utroque latere costæ pinnæ vel costulæ auriculæ pinnæ 1-seriatim dispositi rotundati. Indusium rotundatum ad basin adnatum margine eroso-denticulatum 1½ mm. latum latius quam longius.

Hab. Arisan, ad 8000-7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan. 1912.

General aspect of this new species is just the same as that of *Dryopteris*. But the relationship of this fern and *Arthropteris ramosa* is very close in the venation, sori and especially in the glandular hairs on the rhachis. Our fern differs from that genus only in having unarticulated fronds. So far as I am aware, this is the most tiny form of all the known species of *Nephrolepis*.

Davallia Sm.

Davallia stenolepis HAYATA sp. nov. (Fig. 138). Rhizoma repens

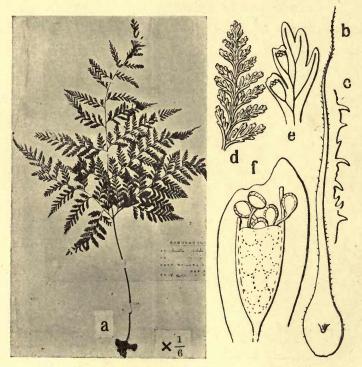


Fig. 138, Davallia stenolepis Hayata; a, the plant; b, a scale on the rhizome; c, margin of the same; d, a pinnule: e, a portion of the same; f, a sorus.

crassiusculum tereti-subcomplanatum 4-5 mm, in diametro squamis dense obtectum, squamis lineariovatis basi ad apicem 1 cm. longis basi peltatis (partibus peltatis ovatis 2 mm. longis 14 mm. latis) medio linearibus 4 mm. latis apice filiformibus margine remote serrulatis. Stipes subteres 20 cm. longus basi plus minus squamatus supra basin toto glaber. Frons triangulari-rhomboidea 30-40 cm. longa totiusque lata quadripinnatifida vel tripinnata (pinnis ordinis tertii pinnatifidis) apice triangulari-acuta, pinnis inferioribus a se 5-6 cm. remotis a costa angulo 60° divaricatis; pinna infima 20 cm. longa oblique triangulari 14 cm. lata apice acuminatissima breve petiolata, pinnulis I. infimis triangulari-lanceolatis 8 cm. longis 4-5 cm. latis a se 3 cm. remotis breve petiolulatis, pinnulis II. oblongis 2½ cm. longis brevissime petiolulatis pinnatifidis, segmentis infimis 8 mm. longis inciso-lobatis, lobis oblongis 1-2 mm. longis apice obtusis vel acutis; rhachis pinnarum tenuiter alata; textura herbaceo-membranacea utraque pagine glabra.

Hab. Taitō: Daironkōsha, leg. U. Mori, 1908, Nov. (No. 2359); Musha (No. 2408); Arisan, leg. B. Hayata et S. Sasaki, 1912, Jan.

Near D. bullata Wall., but differs from it by the thinner texture and by the shape of the sorus-bearing lobes.

Leucostegia Presl.

Leucostegia parvipinnula HAYATA n. n. (Fig. 139). Davallia parvi-

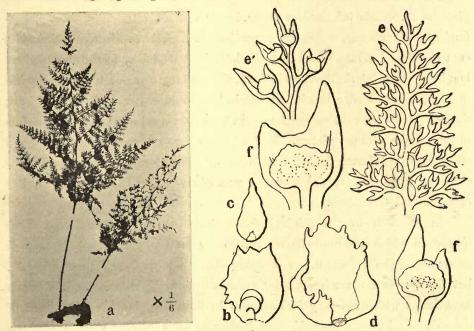


Fig. 139, Davallia parvipinnula HAYATA; a, the plant; b, a scale on the rhizome; c, a scale on the stipe; d, a stipule-like scale on the ramification of a pinnule; e, a portion of a pinnule; e', a portion of the same; f, a segment of a ultimate pinnule with a sorus; f', another segment of the same.

pinnula Hayata Mater. Fl. Formos. p. 431. Davallia Clarkei Hayata in Tökyö Bot. Mag. XXIII. p. 27 (non Baker).

Hab. Mt. Arisan; epiphyta ad truncos *Chamæcyparis* et *Taiwaniæ*, leg. S. Sasaki, Mai., 1913.

Stipites 14 cm. longi glabri stramineo-rubescentes basi plus minus purpurascentes subteretes (supra) profunde 1-sulcati sursum 2-3-sulcati glabri haud squamati basi parce squamati, squamis elongato-triangularibus tenuibus leviter rubescentibus margine erosis apice obtusis. Frondes triangulares 19 cm. longæ basi 20 cm. latæ, pinnis utroque latere 15, infimis 3-pinnatis 10 cm. longis, inferioribus bi-pinnatis 6-7-8 cm. longis a se 3-4 cm. remotis, superioribus brevioribus simpliciter pinnatis 3-4 cm. longis a se 1-2 cm. remotis, sursum minoribus 3 mm.-1 cm. longis a se 3 mm. remotis; pinnis infimis sessilibus lanceolato-ovatis 10 cm. longis 4½ cm. latis, latere inferiore latiore 2½ cm. lato; pinnulis I. infimis brevioribus, (inferioribus longioribus sessilibus angustato-quadrangularibus a se 1-2 cm. remotis pinnatis); pinnulis II. ovatis inferioribus 6 mm. longis obtusis angustatis remote profundeque pinnatifidis, segmentis angustissimis remotis cochlearibus bicornutis cum cornibus 1-3 mm. longis 1-1 mm. latis basi stipitatis, (cornibus exterioribus longioribus interioribus brevioribus), sinibus inter cornua rotundatis; rhaches frondium supra leviter tenuissime bisulcatæ subtus convexæ utrinque glabræ; rhaches pinnarum subcomplanatæ supra plus minus sulcatæ subalatæ; paginæ membranaceæ utraque glabræ. Sori ad sinus furcæ venularum vel interdum ad angulos venularum flexarum ad centrum segmentorum pinnularum II. siti solitarii. Indusium semiglobosum 3 mm. latum 3 mm. longum basi leviter cordatum vel truncatum.

In addition to the original description, I may mention the following characters which are most important, so far as the modern pteridology is concerned. The rhizomes are creeping like that of *Davallia* and *Humata*, but the stipes are never inserted by articulation on the rhizomes. The fronds have scales which are very like stipules in flowering plants, on the point of ramification of pinnæ, pinnules and segments, as is the case with *Acrophorus*.

The habit of this fern is extremely like that of *Davallia*. It is impossible to separate this species from that genus but for the difference of fructification

and the absence of articulation on the rhizomes. The present fern is somewhat near Loxoscaphe gibberosum Moore (Baker Syn. Filic. p. 100) from which it is distinguishable in having much narrower pinnules. It is, as I stated in my former paper, most closely allied to Davallia Clarkei BAKER (= Humata Hookeri Diels = Acrophorus Hookeri Moore) in its pinnatification of fronds and its subcordate indusia. So far as is concerned the delimitation of Humata, Davallia and Acrophorus, as stated by Prof. L. Diels in Engl. u. Prantl Natür. Pfl.-fam., the present fern is different from Davallia in its having inarticulated stipes (which are not joined on the rhizome) and subcordate indusium. It comes nearer to Humata in its subcordate indusia and creeping rhizomes, but it is separable from that genus by the inarticulated stipes. It resembles Acrophorus in the inarticulated stipes, subcordate indusia, and in the presence of stipules, but widely different from that genus in the ramification of fronds, venation and in its creeping rhizomes. If these latter characters should necessitate the separation of our fern from Acrophorus, and the inarticulated stipes from Humata, it should constitute a special genus, Leucostegia Prest. to which Leucostegia immersa and others are referred. Through the courtesy of Mr. E. D. MERRILL, I was so very fortunate as to know the opinion of Dr. COPELAND who was so kind as to send me the following note on this plant. According to Dr. Copeland "this fern is congeneric with Davallia athamantica Christ, Acrophorus Hookeri Moore (Leucostegia, Bedd., Davallia Clarkei Baker), Acrophorus pseudo-cystopteris Moore (Leucostegia, Bedd., Davallia, KZE.) and Leucostegia pulchra J. Sm. (Davallia, Don, Acrophorus, Moore). I would call it Leucostegia n. sp. None of the above species has a functional articulation of the stipe. And the base of some stipes of HAYATA'S fern shows a vestigial articulation. The fern is related to Davallia, but not nearly to Acrophorus. The chaff at the base of the pinnæ does indeed suggest Acrophorus strongly, but this is only an accidental resemblance. There are no such thickenings of the rhachis as in Acrophorus and its relatives Diacalpe, Monachosorum etc., and frond form and rhizome are very different."

Microlepia Presl.

Microlepia grandissima HAYATA sp. nov. (Fig. 140). Rhizoma?

Stipes 90-100 cm. longus stramineus nitidus basi 1 cm. in diametro. Frons in ambitu triangularis bipinnata circ. 100 cm. longa 90 cm. lata apice triangulari-acuta, pinnis infimis longissimis, superioribus gradatim brevioribus

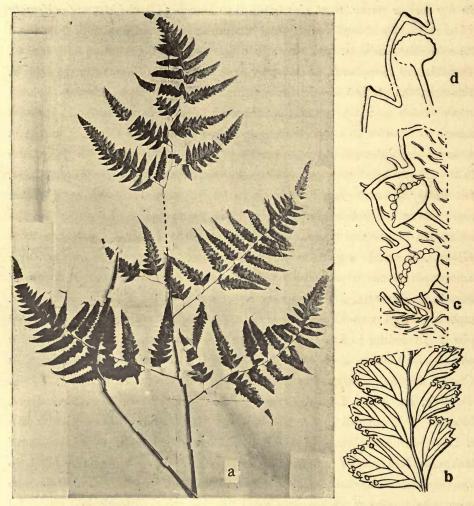


Fig. 140, Microlepia grandissima HAYATA; a, the plant; b, a portion of a pinnule; c, a portion of the same; d, the same, with indusium.

sursum ad segmenta pinnæ terminalis abeuntibus, pinnis infimis 60 cm. longis oblique cuspidato-triangularibus basi 30–40 cm. latis apice cuspidato-acuminatis basi triangulari-acutis petiolatis, petiolis 3 cm. longis, pinnulis infimis (lateris inferioris) longissimis, pinnulis superioribus gradatim brevioribus ad

segmenta pinnulæ terminalis abeuntibus, pinnulis infimis 5 cm. a se remotis petiolulatis (petiolulis 2 cm. longis) triangulari-lanceolatis 22 cm. longis 8 cm. latis apice recto-acuminatis basi latissimis triangulari-truncatis deorsum fere ad rhachin inciso-lobatis sursum dentatis, segmentis vel lobis infimis triangulariovatis 4 cm. longis 2 cm. latis plus minus falcatis vel rectis apice acutis latere superiore latioribus margine subcartilagineo-marginatis serratis, serris acutis, segmentis lobis superioribus gradatim minoribus apice acutis vel obtusis sursum rotundatis gradatim minoribus sursum ad crenam reductis; pinnis inferioribus a se 25 cm. remotis, a rhachibus angulo 60 divaricatis; rhachis frondis inferiore recta sed superiore repando-flexuosa, rhachis pinnularum et costa segmentorum repando-flexuosa superne non elevata dense hirsuta (pilis recurvis brevissimis) subtus elevata glabra, costis segmentorum a rhachibus pinnularum angulo acuto divaricatis, venis lateralibus supra non visis subtus tenuissime elevatis distinctis liberis simplicibus vel furcatis, venulis rectis; pagina superne glabra nitida viridis subtus sub lente pilis minutis parcissime dispersa; textura membranacea vel tenuiter coriacea. Sori sub serris singulis loborum solitariter siti ab apice serrarum 2-1 mm. distantes venulas terminantes. Indusium reniforme 2 mm. latum 1 mm. longum margine superiore liberum crenulatum margine inferiore adnatum.

Hab. Arisan: Arisan-Tōzan, ad 8-9000 ped. alt., leg. B. Hayata et S. Sasaki, 1912, Jan.

Humata grandissima HAYATA in sched. herb. Taihoku.

Near Davallia platyphylla Don (Hook. et Baker Syn. Fil. p. 99. = Microlepia platyphylla (Moore) Bedd. Fer. South Ind. t. 13) and D. lonchitidea Wall. Hk. Sp. Fil. I. p. 173 t. 46, Brit. Exot. Fern. t. 19); but differs from them by the much larger fronds with more shallowly lobed pinnæ and pinnules. The sori are very much like those of Humata. The specimen lacking rhizomes, it is at present impossible to decide whether this is referable to Microlepia or Humata.

Microlepia subpinnata Hayata, sp. nov. (Fig. 141). Rhizoma subrepens teres 2–3 mm. in diametro pilis obtectum, pilis rubro-castaneis ½ mm.–1 mm. longis. Stipes 20 cm. longus intus (supra) profunde sulcatus subglabratus brevissime hirsutus. Frons ovato-lanceolata 50 cm. longa 24 cm. lata apice acuminata basi obtusa ad medium latissima subbipinnata vel

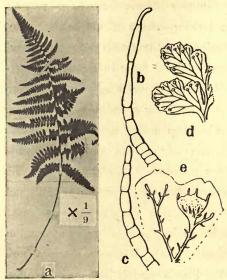


Fig. 141, Microlepia subpinnata HAYATA; a, the plant; b, c, hairs on the rhizome; d, a part of a pinna; e, a portion of a pinnule.

1899.

Near *M. Speluncæ*, but differs from it by the bipinnate fronds with subentire or lobed pinnules.

Microlepia trichocarpa Hayata sp. nov. (Fig. 142). Rhizoma? Stipes 25 cm. longus teres basi 3-4 mm. latus patento-hirsutus intus (supra) profunde sulcatus, pilis patentissimis 1-3 mm. longis pluricellularibus. Frons ovato-lanceolata apice acuto-acuminata infra medium latissima basi minus lata basi abrupte truncata 40-50 cm. longa 22 cm. lata bipinnata, pinnis longissimis lineari-lanceolatis 12 cm. longis 3 cm. latis angulo recto a costa divaricatis apice acuminato-obtusis (a se 3 cm.

bipinnatifida, pinnis mediis lanceolatis 12 cm. longis basi latissimis 3½ cm. latis sessilibus apice acuminatis a se 4-5 cm. remotis, pinnulis inferioribus oblique quadrangularibus 2 cm. longis 1 cm. latis apice obtusissimis basi cuneato-acutis sessilibus basi obliquis margine lobulatis truncatis vel subrotundatis; rhachis, costa vel costula supra glabra profunde sulcata subtus densissime brevissime hirsuta, pilis subadpressis; textura membranacea tenuissima brevissime hirsuta vel subglabrata. Sori submarginales vel a margine ½-1 mm. distantes.

HAB. Rahō, leg. K. MIYAKE, Oct.

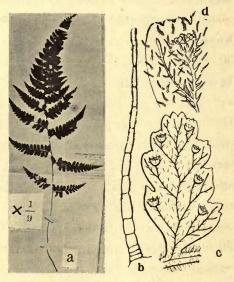


Fig. 142, Microlepia trichocarpa HAYATA; a, the plant; b, a hair on the stipe; c, a pinnule; d, a portion of the same.

remotis basi truncatis subsessilibus vel breve petiolatis, (petiolis 3 mm. longis), pinnulis quadrangulari-oblongis 1½ cm. longis 7 mm. latis apice rotundato-obtusis basi latere superiore late truncatis latere inferiore anguste acutis ad petiolulum 1 mm. longum abeuntibus vel sessilibus duplicato-lobulatis, lobis vel lobulis rotundato-obtusis brevissimis; rhachis, costa vel costula toto hirsuta; textura membranacea tenuis utraque pagine hirsuta. Sori marginales ad sinus lobulorum approximatim siti. Indusium cupuliforme pilosum margine libero ciliatum.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

Near M. subpinnata HAYATA, but differs from it by the setulose indusium and very much more hirsute fronds.

Lindsaya DRY.

Lindsaya kusukusensis Hayata sp. nov. (Fig. 143). Rhizoma

repens tenue teres 1 mm. in diametro parce squamatum, squamis lineari-filiformibus vel piliformibus non adpressis 1 mm. longis castaneis. Stipes 5 cm. longus $\frac{2}{3}$ mm. in diametro glaber tenuis intus (supra) leviter sulcatus.

Frons linearis
30 cm. longa
b
1½ cm. lata
apice gradatim attenuata obtusa
basi gradatim
attenuata pinnata, pinnis
utroque latere
50-60, mediis

semi-lunaribus

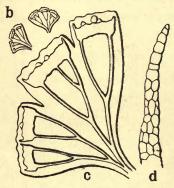




Fig. 143, Lindsaya kusukusensis Hayata; a, the plant; b, pinnæ; c, a pinna; d, a scale on the rhizome.

½ cm. a se remotis 7 mm. longis 5 mm. latis unilateralibus latere superiore late rotundatis (basi latere superiore truncatis 4 mm. longis) basi subito cuneatis ad petiolum subnullum abeuntibus margine remote leviter lobulatis, lobulis

latissimis 3 mm. latis 3 mm. longis apice truncatis; venis subfurcatis; textura membranacea. Sori in lobulis singulis solitarii latissimi marginales.

Kusukusu, Jun. 1912, leg. B. HAYATA et S. SASAKI.

Near L. cultrata Sw., but differs from it by the much narrower and



longer fronds with smaller and broader pinnæ; also allied to Lindsaya linearis Sw. (in Kunze Farnkräuter I. t. 16-1) and Lindsaya gracilis=Lindsaya securifolia Presl. (Kunze Farnkräuter I., t. 85-1), in the linear lanceolate simple pinnate fronds. Perhaps a form of L. cultrata. Sw.

Diplazium Sw.

Diplazium arisanense HAYATA sp. nov. (Fig. 144). Rhizoma ascendens erectum. Stipes tenuis 30 cm. longus teres 2 mm. latus basi squamatus sursum glabratus, squamis castaneis linearibus lanceolatis usque 8 mm. longis usque 14 mm. latis. Frons 40 cm. longa 16 cm. lata ovato-lanceolata apice acuminata basi in ambitu rotundata bipinnata vel bipinnatifida, pinnis infimis minus longis, mediis longissimis lanceolatis 13 cm. longis 3½ cm. latis apice acuminatissimis basi latissimis trun-

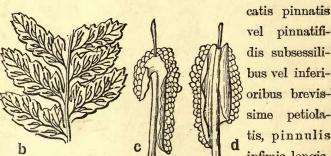


Fig. 144, Diplazium arisanense HAYATA; a, the plant; b, a portion of a pinna; c, a sorus of the Athyrium-type; d, another sorus of the Diplazium-type. longis 13 mm.

vel pinnatifidis subsessilibus vel inferioribus brevissime petiolatis, pinnulis infimis longissimis ovatooblongis21cm.

latis apice in ambitu obtusis basi late cuneatis ad insertionem 3 mm. latis sessilibus paullo inequilateralibus margine leviter lobulatis, lobulis pauce

serratis, serris acutis ascendentibus, vel pinnulis sursum serratis, serris acutis; textura herbacea; pinnæ a rhachibus frondium $50^{\circ}-60^{\circ}$ divaricatæ ascendentorecurvæ, pinnis inferioribus a se $4\frac{1}{2}$ cm. remotis. pinnulis inferioribus a se 1 cm. remotis; costa pinnarum sursum supra canaliculata secus canaliculum utroque remote setulosa, setulis circ. 1 mm. longis. Sori secus costulam utroque latere uniseriatim dispositi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan. 1912.

costalisorum HAYATA sp. nov. (Fig. 145). Rhizoma? Stipes 40 cm. longus parce squamatus fusco-stramineus. Fronstriangularis 60 cm. longa totiusque lata apice in ambitu triangulari-acuta ad summum cuspidata basi latissima bipinnata, pinnis infimis longissimis 30 cm. longis 16 cm. latis ovato-

oblongis apice cuspidato-acuminatis, (acumini-

2-3 cm. longis 3

mm. latis ob-

linearibus

bus

Diplazium

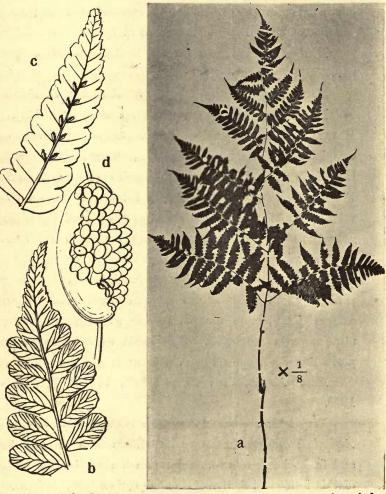


Fig. 145, Diplazium costalisorum HAYATA; a, the plant; b, apical portion of a pinnule; c, a pinnule; d, a sorus of the Allantodia type.

scure dentatis vel subintegris) basi obtusis (petiolis 3 cm. longis), pinnulis mediis longissimis 7 cm. longis, inferioribus brevioribus 5 cm. longis totis lanceolatis sessilibus æquilateralibus apice acuminatis basi truncatis margine (excepto acumine) regulariter lobulatis, lobulis quadrangularibus 7 mm. longis 5 mm. latis apice truncatis margine subintegris; textura coriacea; pinnis a rhachibus frondium angulo 50° divaricatis, pinnulis a rhachibus pinnarum angulo 70°–90° divaricatis; pinnis inferioribus a se 10 cm. remotis, pinnulis inferioribus a se 2 cm. remotis. Sori secus prope costulas utroque latere uni-seriatim siti oblongo-lineares 3–4 mm. longi 1 mm. lati elevati.

HAB. Urai, leg. B. HAYATA et S. SASAKI, Juli., 1912.

Diplazium isobasis Christ Bull. Herb. Bois. 2^m série IV. (1904) p. 618.

Hab. in declivitalibus humidis Takao, leg. U. Faurie, Aprili. 1903.

Diplazium bicuspe Hayata sp. nov. (Fig. 146). Asplenium bicuspe Hayata. Rhizoma erectum breve. Stipes cæspitosus erectus 4 cm. longus complanatus 2 mm. latus squamatus, squamis fusco-nigrescentibus lineari-lanceolatis 3 mm. longis 3 mm. latis apice subulato-acuminatis basi truncatis. Frons lanceolata vel oblanceolata vel lineari-lanceolata 28–30 cm. longa 2 cm. vel 2½ cm. lata apice acuminata sæpe 2–3 lobata, (lobis cuspidiformibus triangularibus apice acuminatis, acuminibus recurvis vel erectis), basi gradatim longe attenuata ad stipitem abeuns margine irregulariter undulata vel remote denticulata vel subintegra; textura herbacea crassiuscula supra viridis subtus pallidior supra glabra subtus deorsum parce minute squamata vel subglabra sursum glabra, costa utraque pagine complanata elevata, venis et venulis utraque pagine non visis. Sori secus costam utroque latere 1-seriatim dispositi lineares a costa 1 mm., a margine 2–3 mm. distantes.

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan. 1912.

Very near Asplenium ensiforme Wall. (Hook. et Gr. Ic. Fil. t. 71) and Asplenium apoense Copeland, but differs from them by the entire involucres and in having fronds which are sometimes 2-4-lobed at the apex. The sori of this fern are usually of the Asplenium-type, but sometimes are of the Diplazium-or Scolopendrium-type.

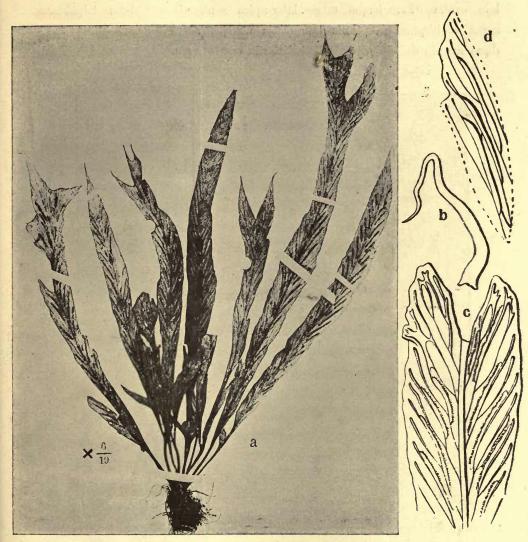


Fig. 146, Diplazium bicuspe HAYATA; a, the plant; b, a scale at the base of the stipe; c, a portion of the frond; d, a portion of the same, showing two kinds of indusia.

Diplazium Kawakamii HAYATA (Fig. 147). Mater. Fl. Formos. p. 435. Stipites 55 cm. longi complanato-tetragoni 4-sulcati basi 7 mm. lati fuscentes tota longitudine dense piloso-squamati, (squamis linearibus incrassatis sub-teretibus plus minus complanatis basi muricatis fuscentibus plus minus crispatis 3-4 mm. longis patento-reflexis vel depresso-reflexis). Frondes

late ovatæ 87 cm. longæ 60 cm. latæ apice acutæ basi obtusæ tripinnatæ superiore bi-pinnatæ, pinnis lanceolatis utroque latere 10 a rhachibus frondium angulo 40°-60° divaricatis inferioribus 40-45 cm. longis a se 13-17 cm.

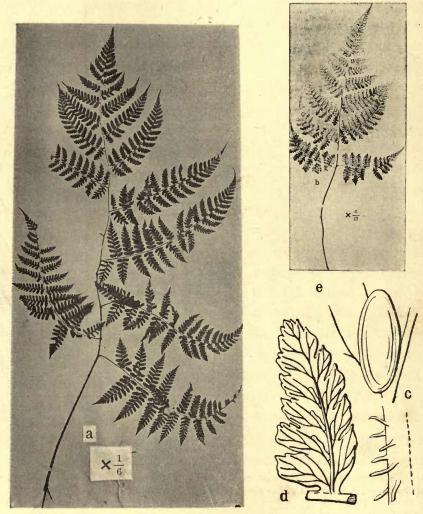


Fig. 147, Diplazium Kawakamii Hayata; a, the plant of a tripinnate form; b, the plant of a bipinnate form; c, viscid hairs on the stipe; d, a pinnule; e, a sorus of the Allantodia-type.

remotis, pinnis infimis longissimis 45 cm. longis 17 cm. latis apice acuminatis obtusis longe vel breve petiolatis (petiolis 3-4 cm. longis), remote

pinnatis, pinnulis I. utroque latere 20 inferioribus 5 cm. a se remotis ovatolanceolatis 10 cm. longis 33 mm. latis apice acuminatis (acuminibus linearibus) basi obtusis breve petiolulatis (petiolulis 3 mm. longis) etiamque pinnatis, pinnulis II. utroque latere 18 inferioribus a se 8 mm. remotis lanceolatis 13 cm. longis 6 mm. latis apice obtusis basi obtusis prope basin latissimis basi constrictis 2 mm. latis latere inferiore plus minus decurrentibus margine truncato-dentatis, (dentibus utroque latere 8 infimis longissimis obtusis interdum paucissime serratis 3 mm. longis 2 mm. latis apice truncatis ascendentibus); pinnulis I. apice attenuato-acuminatis dentato-lobulatis, lobulis vel dentibus truncatis ascendentibus; rhaches frondium complanato-tetragonæ supra et subtus late leviter sulcatæ vel simpliciter concavæ basi 4 mm. latæ inferiore dense superiore paucissime squamatæ, squamis fuscentibus filiformibus patento-reflexis; rhaches pinnarum complanatæ subtetragonæ supra sulcatæ utroque latere sulcorum elevato-alatæ subtus convexæ stramineæ subglabræ; rhaches pinnularum complanatæ supra sulcatæ subtus elevatæ latere alatæ etiamque secus sulcos utroque latere prominente verticaliterque alatæ (alis secus sulcos hac atque illac interruptis 3 mm. latis); pagii se exsiccato supra fuscentes glabræ subtus plus minus pallidiores subglabre, venis et venulis supra impressis subtus leviter elevatis. Sori juxta costam sub quoque dente singuli ad venulas unilaterales sed ad basin venularum bilaterales oblongi prominentes 14 mm. longi 4 mm. lati utrinque obtusi.

Hab. Tösan, leg. T. Kawakami et G. Nakahara, 1906.

Diplazium leiopodum Hayata sp. nov. (Fig. 148). Rhizoma ascendento-erectum. Stipes cæspitosus 16 cm. longus basi squamatus sursum glabratus purpureo-cineraceus vel cineraceus, squamis lanceolatis linearibus acuminatis nigricantibus 6 mm. longis ½ mm. latis. Frons triangulari-lanceolata 20 cm. longa basi latissima 11 cm. lata apice gradatim caudato-acuminata basi truncata bipinnata vel sursum pinnata, pinnis mediis angulo recto a rhachibus divaricatis a se 2 cm. remotis lanceolatis apice gradatim acuminatis basi truncatis subsessilibus 5 cm. longis 1½ cm. latis a medio basi æquilatis brevissime petiolatis versus basin pinnatis sursum lobulatis, lobulis gradatim versus summum ad serrulas abeuntibus, pinnulis

infimis oblongis ovatis 8 mm. longis 5 mm. latis apice truncatis apice margineque



Fig. 148, Diplazium leiopodum HAYATA;
b, a scale on the rhizome; c, a lobe of a upper pinna; d, an indusium of the Athyriumtype.

denticulatis basi subito late acutis sessilibus vel adnatis; pinnis infimis plus minus desuper reflexis; textura membranaceo-coriacea: costæ pinnarum supra leviter canaliculatæ utroque latere interrupte 1-costulatæ, costulis remote setulosis; costæ supra glabræ, subtus pilis unicellularibus glandulosis obtectæ; venis venulisque supra non elevatis subtus elevatis. Sori utroque latere costulæ pinnularum et loborum 1-seriatim dispositi semi-oblongi.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Very near D. tenuicaule HAYATA, but distinguishable only by the indusia which are in D.

leiopodum denticulate, while in D. tenuicaule they are nearly entire.

Diplazium subrigescens HAYATA sp. nov. (Fig. 149). Athyrium subrigescens HAYATA in herb. Taiboku, Rhizoma ascendento - erectum. Stipes usque ad 26 cm. longus albo - stramineus basi nigrescens basi plus minus lanceolato-dilatatus basi dense superiore parce squamatus sursum glabratus,

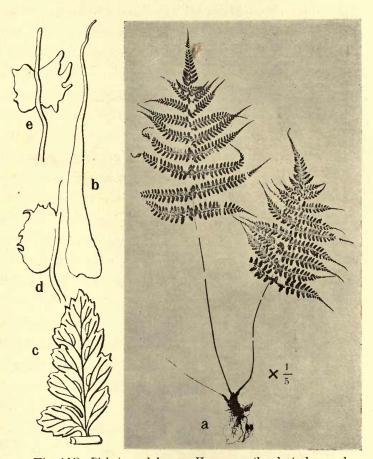


Fig. 149, Diplazium subrigescens HAYATA; a, the plant; b, a scale of the rhizome; c, a pinnule; d, an indusium of the Athyrium-type; e, another indusium of the Diplazium-type.

squamis inferioribus cuspidato-lanceolatis acuminatis basi cordato-rotundatis vel rotundatis margine integris usque 1 cm. longis usque 2 mm. latis nigrescentibus. Frons cuspidato-ovata usque 25 cm. longa usque 20 cm. lata apice longe caudata a medio usque ad basin æquilata sursum subito ad caudam abeuns bipinnata, pinnis mediis vel basilaribus subæqualibus lanceolatis 10 cm. longis 2 cm. latis apice acuminatis (acumine lineari tenuissimo 1–2 mm. lato) basi sessilibus truncatis æquilateralibus, pinnulis sessilibus fere toto æquilongis, mediis oblique oblongis vel semitriangularibus 1 cm. longis 5 mm. latis latere superiore auriculatis latere inferiore cuneatis margine duplicato-dentatis vel serrulatis,

apice in ambitu obtusis vel rotundatis serrulatis, serrulis pinnularum acutis.



Fig. 180, Diplazium tenuicaule HAYATA; a, the plant; b, a pinnule (upper one); c, a sorus of the Allantodia-type.

Rhachis frondis albo-straminea supra sulcata in sulcis ± pubescens; rhachis pinnæ anguste canaliculata in canaliculo ± pubescens supra remote alternatim setulosa; costula pinnularum supra impressa remote setulosa; pagina subherbacea rigescens utraque subglabra; pinnis a rhachibus frondis, pinnulis a rhachibus pinnæ angulo 80°-90° egressis, pinnis inferioribus a se 2½ cm. remotis, pinnulis a se 5 mm. a se remotis. Sori secus costulam utroque latere 1-seriatim dispositi, latere singulo venæ siti vel rarius utroque latere venæ dispositi.

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Allied to Athyrium rigescens Makino. Whether this new fern and its allied species should be referred to Athyrium or Diplazium, is very questionable. The habit of these ferns is rather of the Athyrium-type, but the sori are sometimes of the Diplazium-type. Very remarkable for its having very long slender tails at the apex of the pinna.

Diplazium tenuicaule Hayata sp. nov. (Fig. 150). Rhizoma? Stipes 20 cm. longus subglaber cineraceo-purpurascens. Frons 30 cm. longa 16 cm. lata apice gradatim acuminata basi truncata pinnata vel bipinnatifida, pinnis medio basi æquilongis a se 3 cm. remotis a rhachibus frondium angulo 80° egressis longe lanceolatis 9 cm. longis basi latissimis 3 cm. latis truncatis apice acuminatis pinnetis sursum pinnatilobis, lobulis versus summum ad serrulas abeuntibus, pinnulis infimis oblongorectangularibus 15 mm. longis 8 mm. latis apice rotundatis basi truncatis margine apiceque denticulatis latere lobulatis, lobulis apice denticulatis. Textura herbacea, pagina supra ad costam remote setulosa subtus ad costam pilis unicellularibus glandulosis obtecta, cæterum glabra. Sori secus costas pinnularum vel loborum utroque latere 1—seriatim dispositi.

Hab. In monte Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912. **Diplazium Textori** (Miq.)

Compared with a specimen so labelled in the herbarium at Tōkyō. Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Asplenium Linn.

Asplenium adiantum nigrum Linn. (Fig. 151).

Athyrium adiantum nigrum (LINN.).

Hab. Montibus centralibus, leg. U. Mori, Dec. 1908. Observ.: Rhizoma erectum. Stipes cæspitosus usque 7 cm. longus inferiore rubro-purpurascens sursum castaneus basi dense squamatus, squamis inferioribus rubro-atropurpurascentibus subulato-lanceolatis 5 mm. longis 1 mm. latis apice subulatofiliformibus basi angulato-rotundatis peltatis margine subintegris, squamis superioribus filiformibus plus minus pilosis, sursum glaber. Frons triangulari-oblonga vel ovato-oblonga 10 cm. longa 7 cm. lata apice acuminata ad summum obtusa basi ambitu rotundata bipinnata vel tripinnatifida, pinnis inferioribus longissimis a se 1½ cm. remotis angulo 45°-50° a rhachibus egressis, infimis longissimis 4½ cm. longis 2½ cm. latis ovato-triangularibus apice lineari-acuminatis sed ad summum obtusis basi triangulari-acutis breve petiolatis (petiolis 3 mm. longis), rhachibus complanatis 1 mm. latis, pinnulis primariis inferioribus a se 6 mm. remotis angulo 45° a rhachibus egressis 13 cm. longis 6 mm. latis triangulari-lanceolatis apice lineari-acuminatis ad summum obtusis basi cuneatis breve petiolulatis (petiolulis 1½ mm. longis) basi pinnatifidis, segmentis obovatis 4 mm. longis 2 mm. latis sursum margine serratis basi integris apice obtusissimis basi cuneatis; segmentis ultimis cum rhachibus pinnarum subæquilatis. Textura herbacea crassiuscula. Sori



Fig. 181, Asplenium adiantum nigrum Linn; a, the plant; b, a scale; c, a pinnule; d, a sorus of the Athyrium type.

secus costulas pinnularum utroque latere 1-seriatim dispositi firme approximati lunulares vel interdum sursum firme recurvi.

Compared with an European specimen so labelled in the herbarium at Tōkyō. Perhaps one of the varieties of this species.

Asplenium iridiphyllum Hayata sp. nov. (Fig. 152). Rhizoma erectum brevissime squamatum, squamis cuspidato-lanceolatis 6 mm. longis 1½ mm. latis apice cuspidatis basi rotundatis vel subpeltatis margine subintegris vel remote subdenticulatis. Stipes cæspitosus brevissimus vel nullus basi squamatus, squamis subulato-lanceolatis 4 mm. longis ½ mm. latis apice subulatis basi rotundatis subpeltatis margine longe remoteque ciliatis fuscocastaneis. Frons lanceolata apice gradatim acuta ad summum obtusa basi attenuatissima ad stipitem brevissimum abeuns subsessilis 27 cm. longa 28 mm. lata margine irregulariter crenulata subundulato-plicata simplex versus apicem ascendento-denticulata supra glabra subtus præsertim prope costam vel versus apicem squamis minutis parce dispersa, squamis irregularibus

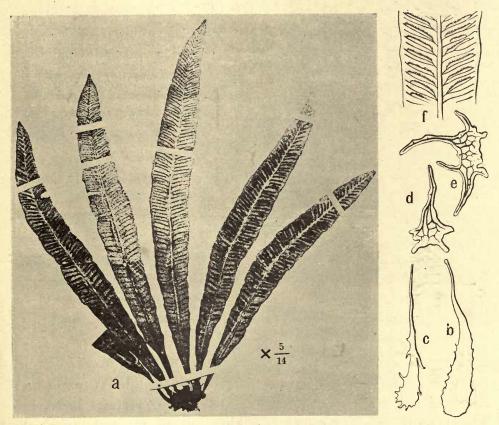


Fig. 152, Asplenium iridiphyllum HAYATA; a, the plant; b, a scale on the rhizome; c, a scale on the stipe; d, c, amceboid scales on the under surface of the upper portion of the frond.

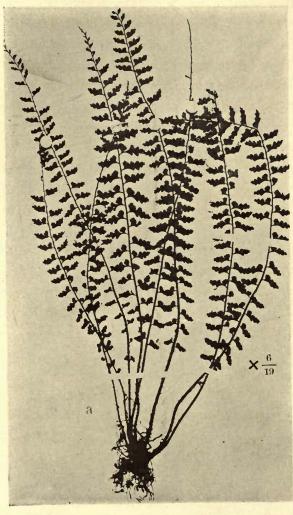




Fig. 153, Asplenium lasiniatum Don; a, the plant; b, a scale on the rhizome; e, a pinna, seen from below; d, a gemmiferous pinna, seen from above; e, a gemma.

amœboideis multiradiatis ½ mm. in diametro fusconigricantibus; pagina supra primum parce squamata demum glabra, costis subtus elevatis, venis venulis subtis non visis. Textura rigide herbacea vel membranacea.

Hab. Shintiku: Goshōsan, leg. U. Mori, Juni., 1906.

The sori are usually of a kind of the Asplenium-type, but sometimes, though very rarely, present transitional forms towards the Diplazium-type. In this respect, the fern may also be referable to Diplazium.

Asplenium lasiniatum Don; (Fig. 153) HAYATA Fl. Mont. Formos. p. 243.

Hab. Mt. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Asplenium Makinoi
HAYATA n. n. (Fig. 154).
Diplazium Makinoi YABE in
sched. herb. Tōkyō, in MATSUM. et HAYATA Enum. Pl.
Formos. p. 600. Rhizoma?
Stipes 20–22 cm. longus

flavo-stramineus subglaber complanatus $2\frac{1}{2}$ mm. latus parce squamatus, squamis lanceolatis 4 mm. longis nigricantibus. Frons 23 cm. longa totiusque lata in ambitu subrotundata apice in ambitu rotundata basi im ambitu acuto-truncata simpliciter pinnata, pinnis utroque latere 2–3, pinna terminali iis lateralibus conformi æquilonga lanceolata 14 cm. longa 21 mm. lata apice lineari-acuminata (acumine 2 cm. longo 1–2 mm. lato) basi subito attenuata ad petiolum abeunti (petiolo 2 cm. longo) margine irregulariter denticulato-crenulata tenuiter desuper angustissime recurva. Textura herbacea crassiuscula subtus pallidissima supra glabra subtus squamis cuspidato-ovatis vel amœboidalibus minutis parce dispersa pel-

lucida, costis utraque pagine elevato-complanatis, venis venulis utraque pagine tenuissimis distincte visis, pinnis lateralibus subsessilibus vel brevissime petiolatis; rhachis angustissime alata. Sori prope costam secus costam 1-seriatim utroque latere dispositi a costa 2 mm., a margine 3-4 mm. remoti.

HAB. Uraisha, leg. S. SASAKI, Oct., 1910.

The fern was named several years ago by Mr. Y. Yabe; but the author's original description has never been published. The above description is dawn from a specimen which is quite identical with the type. So far as I have examined, the sori are of the Asplenium-type, but not of the Diplazium-type.

Near Asplenium Wightianum Wall. figured in Hooker Sp. Fil. III. p. 105 t. 167.

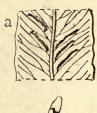
Asplenium Matsumuræ Christ.

Hab. Tötöshö, leg. T. Kawakami et S. Sasaki, Juli. 1912.

Compared with a co-type preserved in the herbarium at Tôkyō.

Asplenium morrisonense HAYATA n. n.

Asplenium laserpitiifolium Lam. var. morrisonense Hayata Mater. Fl. Formos. p. 438.



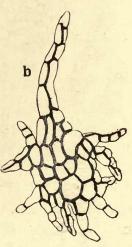


Fig. 154, Asplenium Makinoi Hayara; a, a portion of a pinna; b, as cale on the under surface of the frond.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

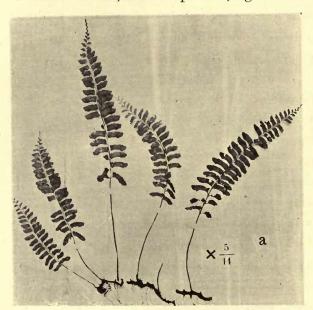
Asplenium planicaule WALL.

Hab. Arisan, ad 7000-6000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Compared with a Japanese specimen so labelled in the herbarium at Tökyö.

Asplenium resectum Sm. form. adiantifrons (Fig. 155).

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.



This form is so widely different from the ordinary one of A. resectum that I thought it to be a distinct species. But, examining closely, I have found that there are many transitional forms between this and the ordinary one.



Fig. 155, Asplenium resectum SM. form. adiantifrons; a, the plant; b, a portion of a frond.

This fern, therefore, though strikingly different from A, resectum, will not

This fern, therefore, though strikingly different from A. resectum, will not claim to be a distinct from the named species, nor even a variety of the latter.

Asplenium ritoense Hayata sp. nov. (Fig. 156). Rhizoma erectum? brevissimum apice squamis dense obteetum, squamis ovato-lanceolatis 2 mm. longis apice obtusis vel acuminatis basi leviter cordatis vel truncatis ferrugineo-nigris margine setulosis. Stipes 1½–2 cm. longus frondibus brevior basi plus minus squamifer toto longitudine (basi excepto) alatus cum alis 1½ mm. latus. Frons elongato-triangularis 3 cm. longa 18 mm. lata pinnatifida apice obtusa basi late truncata, segmentis infimis 5 mm. a se remotis late ovatis

9 mm. longis 7 mm. latis apice obtusis vel truncatis basi subito cuneatis subpetiolulatis inciso-lobatis, lobis brevissimis ± acutis sorum singulum gerentibus; rhachis frondium alata cum alis 1½ mm. lata; textura herbacea utraque pagine glabra, costis venis lateralibus supra distincte elevatis subtus non elevatis obscuris. Sori latere loborum singulo proxime siti. Indusium lunulare margine uni-seriatim rubropunctatum 1¼ mm. longum ¼ mm. latum.

HAB. Mt. Ritōzan, ad 6500 ped. alt., lge. T. KAWAKAMI, Juli. 1913.

Near A. davallioides HOOK.

Asplenium rutæfolium Kunze.

Asplenium prolongatum Hook. f.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Compared with a specimen so labelled in the Tōkyō herbarium.

Asplenium scolopendrifrons Hayata sp. nov. (Fig. 157). Rhizoma breve erectum squamatum, squamis cuspidato-lanceolatis fusco-castaneis 3-4 mm. longis 3 mm. latis apice subulatis





Fig. 187, Asplenium scolopendrifrons Hanata; a, the plant; b, a scale on the rhizome; c, d, amoeboidal scales on the lower surface of the frond; e, a portion of the frond; f, an indusium.

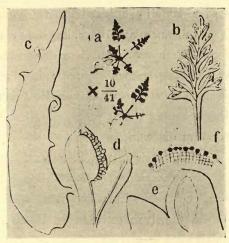


Fig. 186, Asplenium ritoense Hayata; a, the plant; b, a frond; c, a scale on the rhizome; d, apical portion of a frond; e, another portion of the frond with an indusium before opening; f, margin of an indusium.

basi rotundatis subpeltatis margine remote dentato-ciliolatis vel subintegris. Frons oblanceolata 13 cm. longa $1\frac{1}{2}$ cm. lata apice obtusa vel obtusissima basi longe attenuata ad stipitem brevissimum abeuns margine tenuissime recurva irregulariter crenulata supra subglabra subtus parce squamis dispersa, squamis minutis amœboideis multiradiatis $\frac{1}{2}$ mm. in diametro. Textura herbacea. Sori lunulati secus costas prope marginem extensi approximati utroque latere 1–seriatim dispositi.

Hab. Arisan, leg. S. Sasaki.

Near Asplenium scolopendrioides J. Sm. but differs from it by the much smaller fronds with very obtuse apex.

Asplenium tenuicaule HAYATA sp. nov. (Fig. 158). Rhizoma erectum

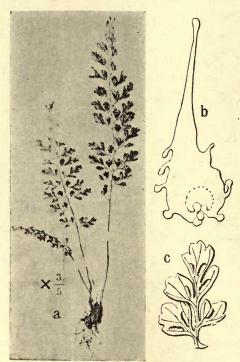


Fig. 158, Asplenium tenuicaule HAYATA; a, the plant; b, a scale on the rhizome; c, a pinna.

brevissimum. Stipes cæspitosus tenuissimus 5 cm. longus subtus (extus) atro-rubro-purpurascens basi squamatus sursum glabratus, squamis inferioribus cuspidato-lanceolatis 3 mm. longis 2 mm. latis basi cordato-decurrentibus rotundatis margine integris remote pauceque glanduloso-ciliolatis vel obsoletis, superioribus linearibus minoribus. Frons lanceolata vel lineari-lanceolata 8 cm. longa 2 cm. lata apice acuminata basi obtusa bipinnatifida, pinnis oblongis 13 mm. longis 6 mm. latis apice obtusissimis basi cuneatis, petiolis 2 mm. longis, pinnulis obtriangularibus vel obovatis apice lobatis basi angusto-cuneatis, lobis acutis. Textura tenuissime herbacea. Sori lineares lunulati 3 mm. longi.

Hab. Arisan, ad 6000-7000 ped. alt., leg. В. Науата et S. Sasaki, Jan., 1912.

Near Asplenium pekinense Hance, but differs from it by the broader lobes of the pinnules.

Asplenium tenuissimum Hayata sp. nov. (Fig. 159). Rhizoma brevissimum erectum tenue. Stipes cæspitosus semiteres lævis tenuissimus 15 cm. longus nitidus intus (supra) canaliculato-planus viridis subtus extus convexus nigro-rubro-purpurascens nitidissimus parce squamatus, squamis inferioribus cuspidatis 3 mm. longis basi 1 mm. latis, superioribus linearibus

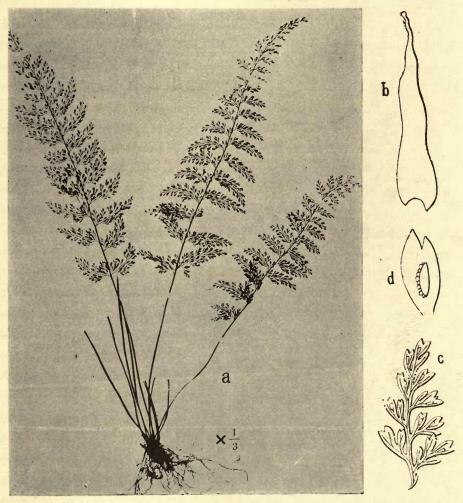


Fig. 1139, Asplenium tenuissimum HAVATA; a, the plant; b, a scale on the rhizome c, a pinnule; d, apical portion of the same with a sorus.

piliformibus 2–3 mm. longis rubro-purpurascentibus. Frons tenuissima herbacca viridissima lanceolata apice acuminata basi truncata 25 cm. longa $7\frac{1}{2}$ cm. lata tripinnata vel tripinnatifida, pinnis oblongo-lanceolatis, inferioribus longioribus, infimis paullo brevioribus, mediis a se $1\frac{1}{2}$ cm. remotis a rhachibus frondium augulo 70° – 80° divaricatis oblongis vel oblongo-lanceolatis apice obtusis basi acutis vel oblique truncatis 3 cm. longis $1\frac{1}{2}$ cm. latis latere superiore latioribus quam latere inferiore, pinnulis ordinis primarii infimis latere superiore



Fig. 160-A, Asplenium: unitaterale Lam. var. obliquissimum Hayata; a, the plant.

ab axilla 1–2 mm. remotis, a se 5 mm. remotis oblongis apice obtusis basi acutis 1 cm. longis 6 mm. latis, pinnulis ordinis secundarii oblongis integris vel 2–3 lobatis apice acutis basi cuneatis 3–4 mm. longis 1–2 mm. latis. Sori sub lobo vel pinnula ordinis secundarii singuli lunulares $1\frac{1}{2}$ mm. longi.

Hab. Arisan, ad 6–7000ped. alt., leg. B. HAYATA etS. SASAKI, 1912, Jan.

Near Asp. tenuifolium Don, (Hook. 2nd Cent. Fern. t. 29, Bedd. Fern. South Ind. t. 130, Handb. Fern. Brit. Ind. p. 161, fig. n. 78), but differs from it by the narrower fronds with much remoter pinnæ.

Asplenium unilaterale Lam. var. obliquissimum Hayata n. v. (Fig.

160 A-B). Rhizoma repens teres tenuissimum $1\frac{1}{2}$ mm. in diametro squamatum. Stipes usque 9 cm. longus nitidus fusco-purpurascens 1 mm. in diametro sectionis

gracillimus glaber basi \pm squamatus. Frons lanceolata apice acuminatissima (acumine lineari) a medio usque ad basi æquilata basi subtruncata usque ad 17 cm. longa usque ad $2\frac{1}{2}$ cm. lata pinnata, pinnis mediis inferioribus subæquilongis, superioribus minoribus versus apicem ad dentem brevem abeuntibus, pinnis inferioribus a se 8 mm. remotis angulo 50° a rhachibus frondium divari-



Fig. 160-B, b, a portion of the frond.

catis oblique rectangularibus $1\frac{1}{2}$ cm. longis 4 mm. latis versus apicem obtusoacutis ad summum obtusis \pm ascendentibus basi acuto-cuneatis subsessilibus vel brevissime petiolatis valde inaquilateralibus, latere superiore basi 6 mm. lato, latere inferiore subnullo, margine superiore obscure crenatis margine inferiore subintegris; pagina utraque glabra tenuissime membranacea semihyalina. Sori a medio frondis sursum dispositi.

Hab. Arisan, ad 7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912. This fern is of a form so strikingly different from ordinary one of the type. But, the transition from this extreme form to the ordinary one has led me to regard the former as a variety of the latter, or more likely as a mere form of the same species.

Asplenium viridissimum Hayata sp. nov. (Fig. 161). Rhizoma? Stipes 40 cm. longus basi parce squamatus purpureo-viridescens superne glabratus subviridescens, squamis angusto-linearibus 13 mm. longis 1½ mm. latis vel valde minoribus et piliformibus. Frons lanceolata 70 cm. longa 35 cm. lata apice acuta vel acuminata basi in ambitu rotundata tripinnatifida, pinnis inferioribus longissimis, infimis plus minus brevioribus, superioribus gradatim minoribus, pinnis longissimis pyramidali-lanceolatis 20 cm. longis 8 cm. latis obliquis (latere superiore latiore basi 6 cm. lato, latere inferiore minus lato 4 cm. lato) basi 10 cm. latis apice acuminatis (acuminibus pinnarum linearibus dentatis), pinnis infimis 5½ cm. longis 3 cm. latis apice obtuso-acutis pinnatis vel pinnatifidis pyramidalibus basi latissimis petiolulatis (petiolulis 3 mm. longis), pinnulis ordinis primarii utroque latere pinnæ inferioris 6-7, infimis ovatis 18 mm. longis 10 mm.

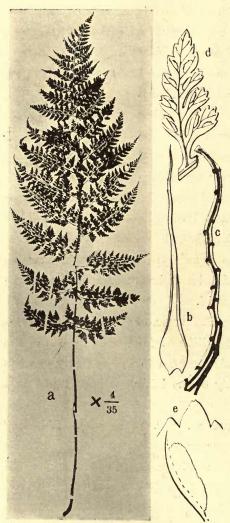


Fig. 161, Asplenium virilissimum Hayata; a, the plant; b, a scale on the stipe; c, a hair-like scale on the stipe; d, a pinnule; e, apical portion of the same.

apice obtusis basi latis acutocuneatis ad petiolulum 2 mm. longum abeuntibus margine simpliciter duplicato dentato-lobulatis, textura herbacea, acutis; lobulis pagina supra viridissima subtus minus viridi. Sori sub lobulis pinnularum primariarum vel secundariarum singuli oblongi 21 mm. longi. Pinnæ mediæ et superiores a rhachibus frondium angulo 50° divaricatæ; pinnæ inferiores a rhachibus frondis angulo 90° divaricatæ. Rhachis frondis complanato-teres supra anguste subalata; rhachis pinnarum præsertim superiorum et pinnularum distincte alata, cum alis 14 mm. lata; costis mediis rhachiarum tenuibus utroque distincte elevatis, costulis pinnularum supra distincte subtus obscure elevatis.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near Asplenium Mertensianum Kze., but differs from it by the much broader fertile pinnules. Also near Asp. affine Sw., but distinguishable from it in having much larger tripinnate fronds of herbaceous texture.

Asplenium Wrightii Eat. var. aristato-serrulatum Hayata n. v. (Fig. 162). Rhizoma? Stipes 15 cm. longus 2½ mm. in diametro castaneo-nigrescens glaberrimus. Frons in ambitu ovato-lanceolata 50 cm. longa 25 cm. lata apice caudato-acuminata basi in ambitu acuta pinnata, pinna terminali_lineari acuto-uncinato-dentata 7 cm. longa acuminata, pinnis lateralibus inferioribus

longisssimis lanceolato-linearibus 14–15 cm. longis basi 13 mm. latis apice acuminato-linearibus basi latissimis subito cuneato-acutis ad petiolum 5 mm. longum abeuntibus margine duplicato-serratis, serris apice uncinato-recurvatis, pinnis mediis a se $2\frac{1}{2}$ –3 cm. remotis, petiolis alatis. Textura herbacea, pagina viridissima, costis et venis utraque pagine elevatis, venis tenuissimis subfurcatis; rhachis supra sulcata nigro-castanea glabra inferiore non alata superiore alata cum alis $2\frac{1}{2}$ mm. lata. Sori lineares a prope costas usque ad sinus serrarum extensi

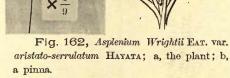
utroque latere costæ uniseriatim approximatim basi pinnarum usque ad apicem dispositi.

Hab. Urai, leg. B. HAYATA, Juli., 1912.

Differs from the type (MAKINO Phanerog. et Pterid. I. t. 5) by the more sharp uncinate teeth curving downwards, more closely arranged sori, and by the much thicker texture. Also near *Asp. contiguum* Klf., but quite distinguishable by the sori reaching nearly to the margin.

Athyrium Roth.

Athyrium erythropodum



Hayata sp. nov. (Fig. 163). Rhizoma? Stipes 40 cm. longus gracilis 2 mm. in diametro basi parce squamatus haud nitidus leviter albo-purpurascens. Frons ovato-triangularis 30 cm. longa 23 cm. lata apice tenuissime cuspidato-acuminata basi latissima subtruncata bipinnata, pinnis inferioribus a se 4 cm. remotis angulo 50° a rhachibus egressis, pinnis mediis longissimis triangulari-lanceolatis 15 cm. longis 5 cm. latis apice lineari-acuminatis tenuissimis (acuminibus linearibus versus summum subsubulatis) basi petiolatis (petiolis 5 mm. longis), pinnulis infimis triangulari-oblongis 3 cm. longis basi 7 mm. latis

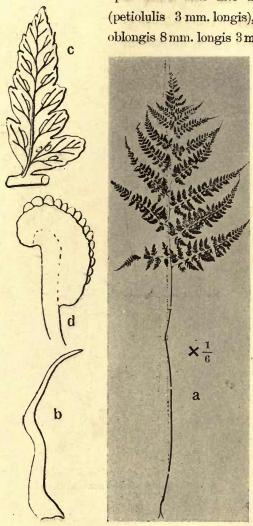


Fig. 163, Athyrium erythropodum HAYATA; a, the plant; b, a scale on the stipe; c, a pinnule; d, a sorus of the Athyrium-type.

apice acutis basi late acutis vel rotundatis petiolulatis (petiolulis 3 mm. longis), pinnatifidis, segmentis infimis oblongis 8 mm. longis 3 mm. latis apice apiculato-acutis basi

cuneatis contractis. Textura herbacea. Sori utroque latere secus costulas segmentorum 1-seriatim dispositi semi-oblongi recurvati.

HAB. Monte Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near Athyrium macrocarpum (Bl.).

Athyrium reflexipinnum HAYATA sp. nov. (Fig. 164). Rhizoma erectum longiusculum cum reliquis stipitum 1 cm. in diametro. Stipes caespitosus usque 5 cm. longus stramineus basi squamatus sursum glaber, squamis lineari-lanceolatis usque 7 mm. longis 3 mm. latis apice subulatis basi latissimis truncatis fuscentibus. Frons lanceolata vel ovato-lanceolata 11 cm. longa 31 cm. lata apice acuminatissima (acumine lineari) basi in ambitu obtusa pinnata, pinnis patentibus superioribus a rhachibus 50°-60° egressis, mediis horizontali-

ter patentibus, inferioribus desuper reflexis, mediis longissimis, infimis brevioribus, superioribus brevioribus versus summum ad dentem acuminis reductis, mediis a se 1 cm. remotis triangulari-lanceolatis 2 cm. longis 12 mm. latis apice acutis basi truncatis sessilibus basi latere superiore latioribus

quam latere inferiore, pinnatifidis vel pinnatilobis, lobis infimis (latere superiore) ovatis 5 mm. longis 3 mm. latis apica in ambitu obtusis basi plus minus contractis margine ascendentodentatis apice tri-dentatis, dentibus triangularibus acutis 1 mm. longis; rhachis pinnarum basi supra lobos infimos 1 mm. lata, costis pinnarum supra ± cana-

liculatis sub-

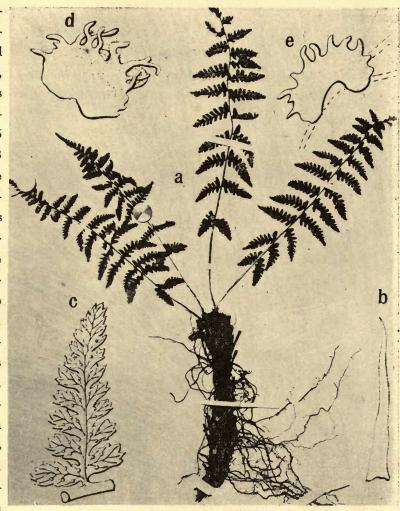


Fig. 164, Athyrium reflexipinnum HAYATA; a, the plant; b, a scale; c, a pinna; d, a sorus of the Dryopteris-type; e, another one of the Athyrium-type.

tus ± elevatis; textura herbacea. Sori secus costas pinnarum vel secus costulas loborum pinnarum utroque latere 1-seriatim dispositi semi-oblongi plus minus recurvi vel semi-orbiculares. Indusium breve subcordatum vel recurvato-lunulare.

Hab. In monte Morrison, leg. S. Sasaki et T. Kawakami, Oct., 1909. Athyrium tozanense Hayata n. n.

Asplenium tozonense Hayata Mater. Fl. Formos. p. 440. Hab. Arisan, leg. B. Hayata et S. Sasaki, 1912, Jan.

Blechnum LINN.

Blechnum integripinnulum HAYATA sp. nov. (Fig. 165). Rhizoma erectum ascendens reliquis stipitum obtectum teres cum reliquis stipitum

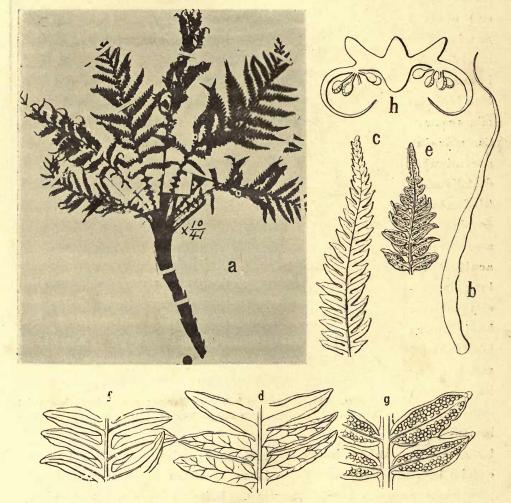


Fig. 165, Blechnum integripinnulum Hayata; a, the plant; b, a scale on the rhizome; c, a pinna of a sterile frond; d, a portion of the same; e, a pinna of a fertile frond; f, a portion of the same (upper surface); g, the same (under surface); h, cross section of a pinnule of a fertile frond. $a = \times \frac{10}{11}$; c and e, natural size; others more or less magnified.

11 cm. in diametro plus quam 15 cm. longum persimiliter supra terram erectum (supraterraneum) apice frondes steriles et fertilesque profuse emittens. Frons sterilis: stipes brevis 3-4 cm. longus squamis dense obtectus, squamis linearibus 1 cm. longis basi 1 mm. latis apice acuminatis filiformibus basi obscure peltatis margine integris; frons obovato-lanceolata 20-25 cm. longa 10 cm. lata recto-patens pinnata vel pinnatifida apice acuta vel acuminata basi subito attenuata ad stipitem brevem abeuns, pinnis mediis longissimis lineari-lanceolatis 6 cm. longis 12 mm. latis apice acuminatis basi ± contractis a se 1½ cm. remotis ad rhachin pinnatifidis, segmentis mediis oblique lineari-triangularibus 7 mm. longis 23 mm. latis apice subito acutis vel obliquis margine integris; rhachibus pinnarum subalatis, alis irregulariter oblique inciso-fidis, segmentis alæ iis pinnarum æquantibus; pinnis infimis subito ad pinnam auriculiformem reductis, auriculis oppositis vel alternis gradatim minoribus a se 6-7 mm. remotis, superioribus angustato-quadrangularibus 7 mm. longis 3 mm. latis basi dilatatis apice obtusis a rhachibus frondium angulo recto divaricatis; pinnis superioribus angulo 50° divaricatis, inferioribus angulo recto egressis; textura subcoriacea pagina glabra, rhachibus costulisque utraque pagine elevatis toto glabris. Frons fertilis: fronde sterili subequilonga ± angustiore lanceolata 6 cm. lata pinnata, pinnis a se 1 cm. remotis lanceolatis, mediis 3 cm. longis 7 mm. latis apice longe caudatis, caudis linearibus 1 cm. longis 2 mm. latis apice obtusis, basi ± petiolulatis, inferioribus gradatim minoribus, pinnatifidis, segmentis linearibus 6 mm. longis 1-2 mm. latis, subtus toto longitudine soriferis; rhachis frondis angustissime alata.

Hab. Taitō: leg. T. Kawakami, 1910, Aprili. (No. 4902).

Quite near B. Fraseri Luerss. and its variety philippinense; but distinctly differs from them by the smaller fronds with entire pinnules. The occurrence of this group of the genus in Formosa is very interesting. There are in all two species and a variety; one species exists in Newzealand, a variety of the same species in the Philippines and the other, the present one, in Formosa.

Coniogramme Fée.

Coniogramme parvipinnula HAYATA sp. nov. (Fig. 166). Rhizoma? Stipes 40-50 cm. longus subglaber stramineus. Frons ovata vel ovato-triangularis 60 cm. longa 40 cm. lata apice triangulari-acuta basi in ambitu late obtusa

bipinnata, pinnis inferioribus longissimis superioribus minoribus sursum ad pinnas simplices lanceolatas reductis, pinnis inferioribus petiolatis (petiolis 3–4 cm. longis) a se 13 cm. remotis pinnatis utroque latere rhachis fron-

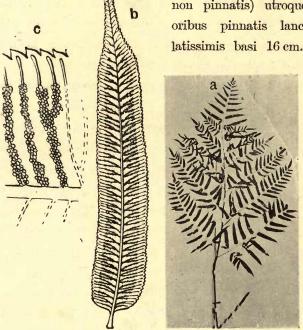


Fig. 166, Coniogramme parvipinnula HAYATA; a, the plant; b, a pinnule; c, a portion of the same.

dis 6-7; pinnis superioribus simplicibus (i.e. non pinnatis) utroque latere 8; pinnis inferioribus pinnatis lanceolatis 30 cm. longis basi latissimis basi 16 cm. latis apice cuspidato-acu-

minatis basi truncatis, pinnulis utroque latere rhachis pinnæ 14, pinnula terminali lanceolata iis superioribus lateralibus majore, pinnulis infimis maximis lineari-lanceolatis 9 cm. longis 12 mm. latis apice lineari-recto-acuminatis basi truncatis margine minute regulariter denticulato-serrulatis, partibus basilaribus truncatis integris petiolulatis, petiolulis 1 cm. longis; pinnulis

superioribus vel pinnis superioribus minoribus lanceolatis sessilibus 27 mm. longis 6 mm. latis; pinnis a rhachibus frondium angulo 45°, pinnulis a rhachibus pinnarum angulo 80°–90° egressis; venis toto liberis furcatis, ramis ad prope apicem serrularum attingentibus, ramis ad apicem clavatis. Textura lierbaceo-membranacea. Sori lineares a costa usque ad $\frac{2}{3}$ secus venas extensi. Indusium nullum.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

I have much hesitated to describe this fern as a species distinct from C. frazinea Fée. In general appearance, the former greatly differs from the latter in having bipinnate fronds with far much smaller pinnules. In close examination, however, the pinnæ and pinnules of our fern show many tran-

sitional forms from smaller to larger ones in one and the same specimen. Further study in the field and exhaustive comparison with rich materials will prove that this is a compound form of *C. fraxinea* Fée.

Hypolepis Bernh.

Hypolepis tenuifolia Bernh. Copeland Polyp. Philipp., p. 95; Diels Natür. Pfl.-fam. Pterid. p. 278, fig. 147-A.

Hab. Köshün, Mt. Hieranzan, leg. B. Hayata et S. Sasaki, Juni., 1912.

Plagiogyria Mett.

Plagiogyria adnata BEDD. Fern. Brit. Ind. t. 51.

Hab. Shinkō: Shibaraku, leg. U. Mori, Juli., 1906.

Compared with a Japanese specimen so labelled in the Tōkyō herbarium. Pinnæ of the fertile frond are more straight, (not crispate) longer and stronger, than those of the Japanese specimen. Perhaps a variety of the type.

Plagiogyria euphlebia METT. HAYATA Mater. Fl. Formos. p. 443.

HAB. Arisan, ad 7000 ped. alt., leg. B. HAYATA et S. SASAKI, Jan., 1912.

Plagiogyria falcata Copel. in Philip. Journ. Sci. Bot. II.-2. p. 133, t. I.-B. Plagiogyria Hayateana Makino in Tōkyō Bot. Mag. XX. p. 245. Plagiogyria Matsumuræ Hayata (non Makino) Fl. Mont. Formos, p. 244.

Hab. Arisan, ad 8000-7000 ped. alt., leg. B. Hayata et S. Sasaki, 1912, Jan.

Plagiogyria stenoptera DIELS.

Hab. Arisan, ad 8000-7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan. 1912.

Compared with a specimen so labelled in the herbarium at Tōkyō.

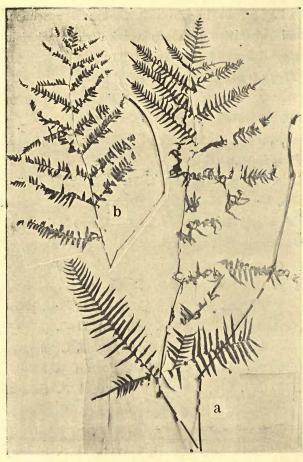
Pteris LINN.

Pteris dactylina Hook. Sp. Fil. II. p. 160 t. 130-A; Hooker et Baker Syn. Fil. p. 155; Bedd. Handb. Fer. Brit. Ind. p. 108 fig. no 56 et Fern. Brit. Ind. t. 23.

Hab. Taitō: Chakankei, leg. U. Mori.

DISTRIB. Nepal to Sikkim and Khasya, ascending to 9000 ft.

Pteris excelsissima Hayata sp. nov. (Fig. 167). Rhizoma? Stipes 150 cm. longus glaberrimus basi castaneo-ferrugineus superiore intus stramineus intus profunde sulcatus validissimus basi 2 cm. in diametro sectionis. Frons



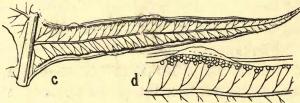


Fig. 167, Pteris excelsissima HAYATA; a, the plant; b, a young specimen; c, a pinnule of the plant; d, a portion of the same.

in ambitu late ovata 130 cm. longa 90-100 cm. lata apice in ambitu late triangulari-acuta bi-tripinnatifida glaberrima subcoriacea vel membranaceo-coriacea, pinnis utroque latere 9 mediis a se 12 cm. remotis lineari-lanceolatis pinnatifidis, pinnis infimis a rhachibus frondium angulo 50° divaricatis longissimis (interdum 2partitis 60 cm. longis 18 cm. latis lanceolatis subsessilibus ad rhachin pinnatifidis, segmento terminali longissimo lineari 14 cm. longo 1 cm. lato apice longe acuminato basi æquilato margine integro, segmentis juxta terminalem et infimis brevissimis 3 cm. longis 1 cm. latis triangulari-acutis, pinnulis mediis longioribus 10 cm. longis 1 cm.

latis apice acuminatis basi decurrento-dilatatis 22 mm. latis cum iis proximatis continuis (sinibus inter segmenta obtusis 13 mm. latis) margine integris; pinna terminali 20 cm. longa cuspidato-ovata 10 cm. lata ad rhachin pinnatifida,

segmento terminali longe lineari $10 \,\mathrm{cm}$. longo; pinnis juxta terminalem $16 \,\mathrm{cm}$. longis; textura membranaceo-subcoriacea; pagina margine sorifera integra, sed prope apicem non sorifera minute crenata. Rhachis pinnarum supra profunde sulcata utroque latere sulcorum 1-lamellata et remote setulosa, setulis $2 \,\mathrm{mm}$. longis latere complanatis a se $1-1\frac{1}{2} \,\mathrm{cm}$. remotis; costa vel costula segmenti supra impressa glabra subtus elevata, venis lateralibus liberis plerumque duplicato-furcatis (venis a basi furcatis, ramis venarum furcatis). Sori marginales a prope basin segmentorum usque ad supra medium extensi, ab apice segmentorum $1 \,\mathrm{cm}$. distantes.

Hab. Arisan, fere 7-6000 ped. alt., leg. B. Hayata et S. Sasaki, 1912, Jan.

Very near *Pteris excelsa* Gaud. (Hook. Sp. Fil. II. p. 183 t. 136; Bedd. Fern. Brit. Ind. t. 218; and Herb. Corean. tested by Dr. T. Nakai); but ours is different from that in having pinnules or segments with broader base and very much more acuminate linear apex. It should be better regarded as a variety of the same species and should be named *P. excelsa* var. *excelsissima*.

Pteris pellucida Pr.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Formosan specimen is considerably different from the named species by the much narrower pinnæ of the fertile and sterile fronds, as far as I can draw from the descriptions given in Hook. Bak. Sy. Fil. and Hook. Sp. Fil. In the Philippine specimens, there is a fern labelled *P. pellucida* which is exactly identical with our fern. I conject that this *Pteris* may vary a very wide range. At present, I am merely following the Philippine plant to take this name for our fern. The description in Hook. et Baker Syn. Fil. p. 154. shows that the fern has often lower pinnæ 8 in long 1 in. broad The figure given in Hooker Sp. Fil. II. t. 126-B shows also a form with broader fronds than those of ours.

Pteris setuloso-costulata HAYATA sp. nov. (Fig. 168). Rhizoma? Stipes 30–40 cm. longus 3 mm. latus stramineus glaber. Frons oblongo-lanceolata 60 cm. longa 30 cm. lata apice triangulari-acuta pinnata vel bipinnata in partibus infimis, pinnis suboppositis inferioribus a se 4–8 cm. remotis a rhachibus angulo 60° egressis, pinnis infimis magnis 18 cm. longis semitriangularibus basi 14 cm.

latis latere inferiore pinnulis 3-4 gerentibus latere superiore haud pinnuliferis subsessilibus vel breve petiolatis, pinnulis infimis a rhachibus pinnarum angulo 70°-90° divaricatis sessilibus late linearibus 13 cm. longis 2½ cm. latis



basi truncatis ad apicem subito acutis ad acumina abeuntibus (acuminibus linearibus 2 cm. longis 3 mm. latis margine crenulatis ad summum acutis) ad rhachin pinnatifidis, segmentis alternis linearibus a rhachibus pinnularum angulo 80° divaricatis 15 mm. longis $3\frac{1}{2}$ mm. latis apice rotundato-obtusis basi plus minus dilatatis 5

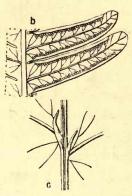


Fig. 168, Pteris setuloso-costulata HAYATA; a, the plant; b, a portion of a pinnule; c, setules on the costa.

mm. latis ad basin se continuis approximatis margine integris nervo-marginatis. Textura chartacea supra glabra, costulis utraque pagine elevatis venis venulisque liberis a basi vel a medio furcatis, venulis ad marginem attingentibus supra subglabris subtus parcissime minuteque sub lente glanduloso-pilosis; costulis pinnarum utraque elevatis supra profunde sulcatis, utroque latere sulcorum anguste lamellatis,

lamellis remote minute setulosis, setulis acutis complanatis, segmentis margine toto latere (excepto basi apiceque) soriferis.

Hab. Mt. Morrison, ad 6000 ped. alt., leg. U. Mori, 1909, (No. 1867);Mt. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near Pteris biaurita Linn. (Hooker et Grev. Ic. Fil. t. 142), but differs from it by the lowest pinne, which are not biparted, but have 2-3-pinnules on the lower side. This is still nearer Pteris quadriaurita var. setigera (Hook.) (Bedd. Fern. Brit. Ind. t. 202), which has setulose rhachis like that of the present fern.

Pteris tripartita Sw.

HAB. Taitō: Nanrio, leg. G. NAKAHARA, Jan., 1906, No. 703).

Compared with a specimen from the Philippines.

Vittaria Sm.

Vittaria arisanensis Hayata sp. nov. (Fig. 169). Epiphytica. Rhizoma tenue dense squamatum, squamis

tenuibus linearibus 10 mm. longis ½ mm. latis apice acuminatis. Stipes subnullus. Frons linearis 50–60 cm. longa 8–9 mm. lata apice acuminata attenuata ad stipetem subnullum abeuns integra utraque glabra non squamata chartacea, costis supra non visis subtus fere distinctis sed non elevatis, margine subplana leviter recurvata vel non recurvata; venis lateralibus liberis laxissime dispositi. Sori a margine 1–1½ mm. distantes.

Hab. Mt. Arisan, leg. B. Hayata et S. Sasaki, 1912, Jan. Differs from V. lineata by the much larger fronds and by the sori which are not wrapped by the margin.

Vittaria sp.

A very slender fern resembling V. lineata (Lowe Ex. Fer. Vol. II. t. 65-A; EAT. Fern. North Americ. t. 38). No fructification.

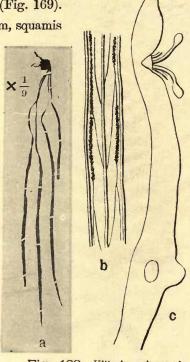


Fig. 169, Viltaria arisanensis: HAYATA; a, the plant; b, a portion of the frond (underside); c, a portion of cross section of the frond.

Polypodium LINN.

Polypodium arisanense Hayata sp. nov. (Fig. 170). Epiphytica. Rhizoma repens complanato-teres 4 mm. in diametro sectionis ad insertionem stipitum valde elevatum (partibus elevatis 2 mm. longis) squamis dense obtectum, squamis cuspidato-triangularibus apice lineari-cuspidatis basi subtus latissimis 1½ mm. latis 3 mm. longis basi alte cordatis vel auriculato-cordatis, (auriculis cordum ½ mm. longis subimbricatis basi 2-lobatis, lobis triangularibus margine remote denticulatis), supra insertionem pilis longiusculis 1 mm. longis 5-6 instructis castaneis. Stipes intus sulcatus stramineus extus rotundatus castaneus semiteres 2 mm. in diametro 10 cm. longus gracillimus glaber liaud

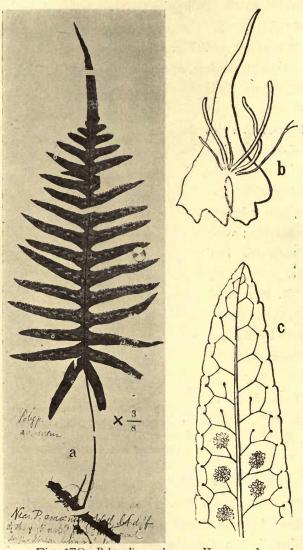


Fig. 170, Polypodium arisanense Hayata; b, a scale on the rhizome; c, a portion of a pinna.

dato - ovato - lanceolata pinnatifida 26 cm. longa 10 cm. lata apice longe caudata, pinna vel segmento terminali longissimo lineari 8 cm. longo 8 mm. lato apice lineariacuminato ad summum obtuso basi haud contracto tenuiter serrulato, serrulis obtusis ascendentibus brevissimis approximatis 2 mm, a se distantibus latere inferiore 2 mm. longis costa cum costa parallelis latere superiore 1-1 mm. longis, areolis costalibus subrectangularibus 3 mm. longis totiusque latis venulas liberas singulas includentibus, venulis liberis soro terminatis; segmentis vel pinnis lateralibus juxta pinnam terminalem brevissimis triangulari-oblongis circ. 8 mm. longis 5 mm. latis apice obtusis

squamatus. Frons cau-

vel rotundatis a rhachibus frondium 80° egressis, segmentis inferioribus gradatim longioribus, segmentis infra medium longissimis a rhachibus frondium circ. 90° egressis 55 mm. longis 10 mm. latis linearibus apice acuminatis ad summum obtusis basi latissimis dilatatis, sinibus inter segmentorum obtusis apice a costa rhachis frondis 3 mm. distantibus, segmentis infimis desuper

reflexis brevioribus $4\frac{1}{2}$ cm. longis; costis segmentorum supra |plano-elevatis, subtus acuto-elevatis; areolis costalibus secus rhachin frondis linearibus mediis $1\frac{1}{2}$ cm. longis $1\frac{1}{2}$ mm. latis; costis venis venulisque utraque pagine distincte nigro-coloratis; pagina supra glabra subtus ad costas venasque sub lente minute parcissime squamata vel demum glabrata. Textura membranacea. Sori dorso ad paginam superiorem elevati, partibus elevatis rotundatis medio umbonato-impressis.

Hab. Arisan, ad 8000-7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Near Polypodium formosanum Baker, but differs from it by the more acuminate pinnæ which are more or less ascending, but not quite horizontally arranged like those of *P. formosanum*. Also near *P. amænum* Wall. = Goniophlebium amænum J. Sm. (Bedd. Fern. Brit. Ind. t. 5), but distinguishable from it by the quite naked fronds with much longer linear terminal lobes.

Polypodium decrescens Christ (Fig. 171) var. blechniftons n. v. Rhizoma repens teres tenue minus 1 mm. crassum dense squamatum dense radicans dense foliosum, squamis fusco-castaneis tenuissimis lanceolatis 4 mm. longis 3 mm. latis apice acuminatis basi rotundatis subcordatis non peltatis. Stipes brevis usque 1 cm. longus semiteres supra (intus) planus densiuscule pilis horizontaliter patentibus obtectus, pilis 1-seriatim pluricellularibus castaneorubescentibus 1½ mm. longis apice clavatis, præterea pilis brevissimis 2cellularibus apice clavatis latioribus parce dispersus. Frons lanceolata vel oblongo-lanceolata 13 cm. longa 3 cm. lata apice acuta vel caudato-acuminata (caudis linearibus 2½ cm. longis 2½ mm. latis ad summum obtusis) vel ecaudata simpliciter acuta basi subito cuneata attenuata lineari-attenuata ad stipitem 1 cm. longum abeuns, (partibus attenuatis 4½ cm. longis sursum 1 cm. latis deorsum 14-1 mm. latis margine undulato-repandis, undulis gradatim minoribus demum ad nullum abeuntibus, undulis superioribus triangularibus 4 mm. latis 2 mm. longis apice obtuso-rotundatis), partibus principalibus (partibus frondis exceptis partibus attenuatis et caudis) toto circ. ad rhachin pinnatifidis, segmentis linearibus rectis circ. angulo 50°-60° a rhachibus frondis egressis versus apicem angustioribus ad summum obtusis deorsum latioribus ad basin plus minus dilatatis, mediis 13 mm. longis basi 3-4 mm. latis a se (a

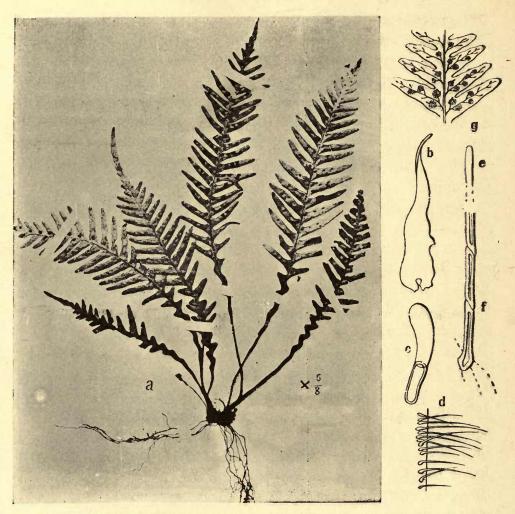


Fig. 171, Polypodium decrescens Christ var. blechnifrons Havata; a, the plant; b, a scale on the rhizome; c, a glandular hair on the stipe; d, hairs on the stipe; e, apex of one of the same hairs; f, basal portion of the same; g, a portion of the frond.

margine ad marginem) 3 mm. remotis margine integerrimis plus minus desuper recurvis, sinibus inter segmentos linearibus apice obtuso-rotundatis. Textura crassiuscula tenuiter coriacea, pagina subtus subplana parcissime pilis brevissimis glanduliferis dispersa supra subglabra secus sulcis costarum remotissime paucissime barbis dispersa; rhachibus frondium supra sulcato-impressis, costulis segmentorum supra non visis tenuiter impressis.

Sori utroque latere costæ 1-seriatim suboppositim dispositi, a se 2-3 mm. remoti oblongo-rotundati $1\frac{1}{3}$ mm. longi.

Hab. Arisan, inter Funkiko et Taroyen, ad 6000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Very near the type which is known to exist in Celebes and the Philippines. I have not seen either the authentic specimen or original description. So far as is concerned a specimen from the Philippines labelled "Polypodium decrescens Christ, teste Christ, Bagnen, Lepanto, Luzon, 6500 ft. Nov. 1905, No. 1916," and figures given in the Philip. Journ. Sc. I. Supp. II. t. 17, the present fern is slightly different from the type in having broader fronds and longer stipes. This new variety is somewhat near P. obliquatum Drude, but quite distinguishable from it in having linear obtuse pinnæ arranged in a much acuter angle and by the elevated (not immersed) rounded sori. It is also near Polypodium Thwaitesii Bedd. (Handb. Fern. Brit. Ind. p. 310, fig. 164 and Fern. Brit. Ind. t. 188.),

P. repandulum METT. (BEDD. Handb. Fern. Brit. Ind. p. 313, fig. 167) and P. subfalcatum BL. (BEDD. Fern. Brit. Ind. tt. 76 et 189), but differs from all of them and especially from the last one by the entire pinnæ or lobes of the fronds.

Polypodium falcatopinnatum HAYATA sp. nov. (Fig. 172).

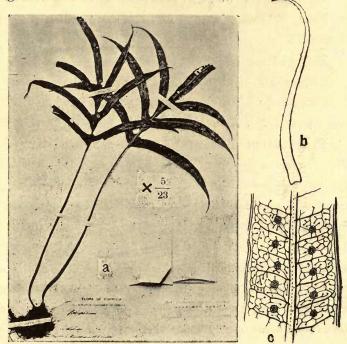


Fig. 172, Polypodium falcatopinnatum HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond.

Rhizoma repens teres 4–5 mm. in diametro squamis dense obtectum, squamis valde adpressis ovato-cuspidatis 2–3 mm. longis. Stipes 20–25 cm. longus glaberrimus esquamatus intus (supra) profunde sulcatus stramineus. Frons late triangularis stipitem in longitudine subæquans vel eo brevior 20 cm. longa 25 cm. lata pinnatifida, pinna terminali lineari 15 cm. longa apice longe acuminatissima 15 mm. lata margine plana undulato-crenata vel subintegra, pinnis lateralibus pinna terminali conformibus æquilongis falcato-recurvis apice acuminatis (acuminibus linearibus desuper falcatis) utroque latere rhachis frondis 3–4 suboppositis basi longe decurrentibus fere ad rhachin attingentibus 2 cm. a se remotis, sinibus inter pinnas latis rotundatis, costis et costulis supra subelevatis distincte sulcatis, pinnis a costa angulo 60° divaricatis patentibus, venis lateralibus utraque pagine elevatis tenuibus a costula angulo 70° divaricatis. Sori utroque latere costæ pinnæ uniseriatim dispositi inter venas solitarii.

Hab. Kötöshö: leg. T. Kawakami et S. Sasaki, Juli., 1912, (No. 5).

Near P. palmatum Blume, but differs from it by the pinnæ curving downwards.

Polypodium gracillimum COPEL.

Polypodium cucullatum Hayata Mater. Fl. Formos. p. 445 (Non Nees). Compared with a specimen from the Philippines labelled "P. gracillimum Copel. Mt. Apo, Mindaneo, alt. 6000 ft. Oct. 1904, No. 1526."

Polypodium lineare Thunb. var. monilisorum Hayata n. v. (Fig. 173). Rhizoma repens gracile 1–1½ mm. crassum, squamis dense obtectum, squamis rubro-castaneis ovato-lanceolatis 2½ mm. longis ¾ mm. latis apice acuminatis basi latissimis ovatis peltatis basi rotundatis vel plus minus angulatis a basi usque ad insertionem ½ mm. longis margine remote obscure denticulatis vel subintegris medio rubro-maculatis, maculis ovato-lanceolatis. Stipes circ. 1 cm. longus glaber. Frons linearis curva 15 cm. longa 3–4 mm. lata apice lineari-acuminata basi gradatim attenuata ad stipitem brevem abeuns in exsiccato inter soros plus minus moniliforme constricta supra glabra subtus secus costas squamis remote parceque dispersa vel glabrata supra in exsiccato pallido-viridis subtus pallidissima plus minus flavescens, costis utraque pagine elevatis. Textura tenuiter coriacea. Sori infra acumen 2 cm. longum 2 mm.

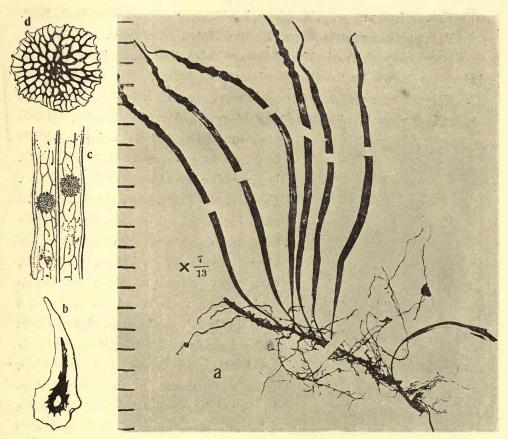


Fig. 173, Polypodium lineare Thuns. var. monilisorum Hayata; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, a paraphysis.

latum frondis deorsum usque ad 3–4 cm. dispositi utroque latere costæ 1–seriatim dispositi suboppositi elliptico-rotundati $3\frac{1}{2}$ mm. longi $2\frac{1}{2}$ mm. lati longiores quam latiores inferiores a se 4 mm. remotis; paraphisis paucissimis peltatis rotundatis margine denticulatis.

Hab. Monte Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Differs from the type by the roundly peltate paraphysis of the sori, much narrower and less coriaceous frond and especially by the soriferous parts of the fronds which are moniliformly contracted when dried.

Polypodium Meyenianum (Schott), Hook.; Matsum. et Hayata Enum. Pl. Formos. p. 634.

Hab. Hieranzan, prope Kusukusu, leg. B. Hayata et S. Sasaki, Juni., 1912. Polypodium morrisonense Hayata Mater. Fl. Formos. p. 447.

Near Pleopeltis hemionitidea Moore. = Polypodium hemionitideum Wall., but differs from it by the thin membranaceous texture.

Polypodium pellucidifolium HAYATA sp. nov. (Fig. 174). Rhizoma repens teres squamis patentibus dense obtectum 3-4 mm. in diametro, squamis

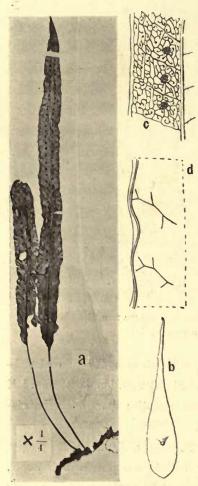


Fig. 174, Polypodium pellucidifolium HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, margin of the same.

ovato-lanceolatis peltatis apice cuspidatis basi rotundatis castaneis. Stipes 10-9 cm. longus glaber intus (supra) profunde sulcatus. Frons linearis 35 cm. longa 22 mm. lata apice acuta basi acuta vel cuneato-acuta margine integra vel crispato-undulata plus minus tenuiter desuper recurva vel plana supra nitida, costa supra profunde sulcata subtus prominente elevata, venis lateralibus subrectis a costa angulo 65° egressis supra nigro-coloratis leviter flexuosis valde distinctis subtus tenuiter elevatis prope marginem evanescentibus, reticulis venularum supra visis; textura tenuiter coriacea pellucida. Sori uniseriatim a infra medium usque ad apicem frondis dispositi, inter venas laterales solitarii.

Hab. Arisan, leg. B. Hayata et S. Sasaki, Jan., 1912.

Near P. Engleri, but differs from it by the shining semi-transparent larger fronds with distinct veins.

Polypodium obtusifrons HAYATA n. sp. (Fig. 175). Rhizoma repens teres 2 mm. crassum squamis dense obtectum, squamis castaneis cuspidato-rotundatis 2 mm. longis 1 mm. latis apice obtuse lateque cuspidatis basi dilatatis rotundatis profunde cordatis,

lobis cordis valde imbricatis ½ mm. longis, margine sursum irregulariter obscureque denticulatis vel subintegris deorsum lasiniato-lobulatis, lobulis linearibus recurvis, vel peltatis elobatis. Stipes brevissimus 1 cm. longus complanatus supra planus subnullus glaber. Frons spathulata vel lineari-spathulata 4 cm. longa usque 9 mm. lata sursum infra apicem 6 mm. lata apice obtusissime vel rotundata valde crassa margine integerrima tenuiora anguste subcartilaginea, costa

utraque pagine a basi usque ad medium tenuiter obscure visa a medio ad apicem non visa haud elevata; frons medio usque ad prope apicem sorifera. Sori a medio usque ad prope apicem frondis utroque latere coste 1seriatim dispositi perfecte rotundati 24 mm. in diametro supra ad paginam plani, paraphysis numerosis peltatis angulatorotundatis vel margine sublobatis.

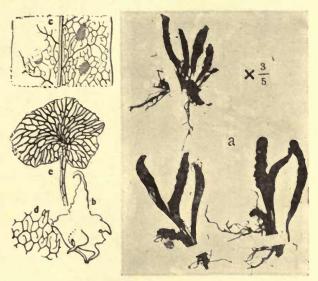
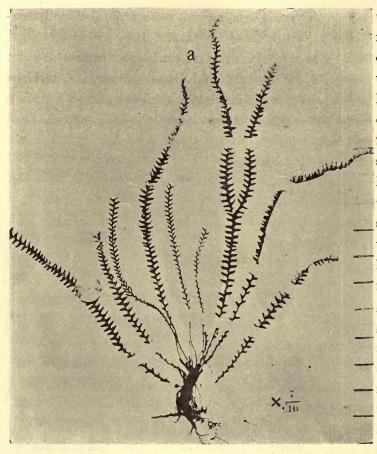


Fig. 178, Polypodium obtusifrons HAYATA; a, the fronds; b, a scale on the rhizome; c, a portion of the frond; d, reticulation of the veinlets; c, a paraphysis.

HAB. Kwannonzan, leg. T. Soma, 1910, Oct.

Near P. lineare Th. but differs from it by the very much shorter obtuse fronds with quite different venation. Still nearer to Polypodium Oncei Fr. et Sav. (Makino Phanerog. et Pterid. I. t. 10), but differs from it by the much complicated reticulation of the fronds which have more obtuse rounded apex.

Polypodium pseudotrichomanoides Hayata sp. nov. (Fig. 176). Rhizoma ascendento - erectum circ. 1 mm. crassum densissime radicans (radicibus fibrosis numerosis) densissime squamatum, squamis castaneo-fuscentibus tenuissimis sub luce traverso flavis ovato-lanceolatis usque 1½ mm. longis ¼ mm. latis apice acuto-obtusis vel obtusis basi rotundatis. Stipes



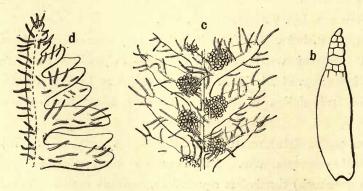


Fig. 176, Polypodium pseudotrichomanoides HAYATA; a, the plant; b, a scale on the rhizome; c, a portion of the frond; d, apical portion of the frond.

versus apicem rhizomatis dense cæspitosus brevissimus 1 mm. longus basi ad extremitatem 2-3 squamatus semiteres. Frons linearis simplex vel a medio sursum furcata usque 13 cm. longa usque 6 mm. lata apice gradatim angusta ad summum obtusa vel a globulo terminatabasilongeattenuata angustata ad stipitem brevem abeuns pinnatifida; rhachis medio 1 mm. lata; segmentis mediis triangulari-linearibus latere superiore 21 mm. longis latere inferiore totiusque longis apice obtusis basi ±dilatatis 1 mm.

latis prope basin sorum singulum gerentibus margine integris circ. angulo 90° vel 85° a rhachibus egressis a se $1\frac{1}{2}$ mm. remotis, segmentis superioribus gradatim minoribus se approximatis, segmento terminali subnullo vel ad globulum minutum reducto, segmentis inferioribus gradatim minoribus se plus remotis prope basin frondis ad dentem triangularem $\frac{1}{2}$ mm. longum obtusum reductis a se 2 mm. vel plus remotis ad extremitatem frondis ad alam angustissimam reductis, segmentis in sectione plano-convexis α -formibus supra convexis subtus planis; pagina subcrassiuscula utraque præsertim ad costam parce strigoso-pilosa, pilis validis castaneo-nigris usque 1 mm. longis, supra ad costam anguste sulcata subtus plana, venis non elevatis simplicibus haud ramosis, costis subtus non sulcatis.

Hab. Arisan, leg. S. Kusano; ibidem, leg. B. Hayata et S. Sasaki, Jan., 1912.

Near Polypodium trichomanoides Sw., but differs from it in having simple veins and entire scales; from P. Okuboi Yatabe and P. setosum Mett. in having much narrower pinnæ.

Polypodium quasipinnatum HAYATA Mater. Fl. Formos. p. 447.

Near *Pleopeltis Moulmeinensis* Bedd. Fern. Brit. Ind. t. 205, but differs from it by the sori arranged in two or three rows on each side of the costæ. Also very near *P. malacodon* Hook.

Polypodium rostratum Hook. (Fig. 177). Hook. 1-st Cent. Fern. t. 53; Bedd. Fern. Brit. Ind. t. 159 et Handb. Fern. Brit. Ind. p. 347 fig. 193 cum nomine *Pleopeltis rostrata* Hook.

HAB. In monte Morrison, ad 7000 ped. alt., U. Mori, 1906, Dec. (No.

leg. U. Mori, 1906, Dec. (No. 1896). Our fern closely resembles *P. rostratum* in the size, shape and texture of the fronds, but is a little different from it in the venation, as far as is concerned the figures in Bedd. Fern. Brit. Ind. t. 159, and Hook. Ic. Pl. t. 953.



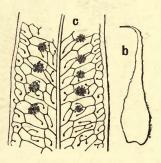


Fig. 177, Polypodium rostratum Hook.; a, the plant; b, a scale; c, a portion of the frond.

The venation of our fern is more finely reticulated than that figured in Hook's work, but more loosely reticulated than that figured in BEDDOME's.

Polypodium tenuissimum Hayata sp. nov. (Fig. 178). Rhizoma breve tenue erectum apice dense squamatum apice stipites cæspitosum gerens, squamis tenuissimis fuscis oblongo-lanceolatis usque 1½ mm. longis ½ mm. latis apice obtusis bisetosis basi ± rotundatis vel leviter cordatis. Stipes brevissimus 1–2 cm. longus ad apicem rhizomatis cæspitosus ad basin

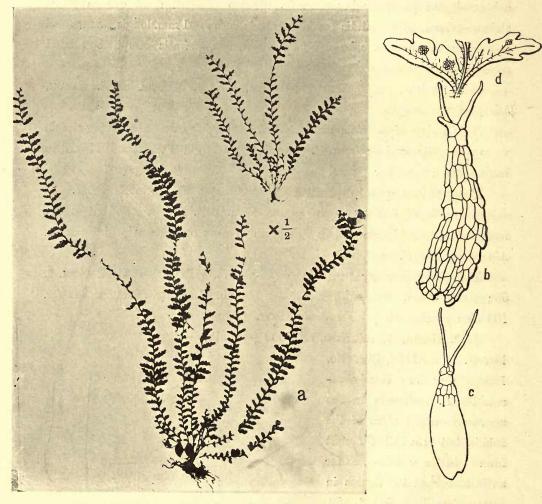


Fig. 178, Polypodium tenuissimum HAYATA; a, the plant; b, a scale on the rhizome; c, another smaller one; d, a portion of the frond.

squamatus supra basin sursum barbatus, barbis horizontaliter patentibus mollis 1–1½ mm. longis tenuissimis fuscentibus. Frons tenuissima utraque pagine præsertim ad costas venasque barbis mollis dispersa herbacea scandens usque 20 cm. longa 13 mm. lata apice acuminata ad summum obtusa basi gradatim attenuata circ. ad rhachin pinnatifida, segmentis mediis circ. 6 mm. longis 1–2 mm. latis sublineari-oblongis a rhachibus frondis 80°–70° egressis a se 3 mm. remotis apice obtusis basi latere inferiore decurrentibus margine latere superiore plus lobulatis quam latere inferiore, lobis 1 mm. longis obtusis; segmentis prope apicem subito vel gradatim minoribus ad lobos 2 mm. longos abeuntibus, segmento terminali 2 mm. longo obtuso, segmentis inferioribus gradatim minoribus, infimis ad dentem triangularem 1 mm. longum reductis; rhachis medio ½ mm. lata, costis utraque pagine elevatis, venis utraque pagine non visis parce ramosis. Sori sub basi lobulorum segmentorum singulariter siti rotundati ¾ mm. in diametro.

Hab. Arisan, ad 8000-7000 ped. alt., leg. B. Hayata et S. Sasaki, Jan., 1912.

Near *P. solidum* Mett, but differs from it by the thinner herbaceous texture, bluntly lobed pinnæ, and hirsute fronds and venis; also near *P. cucullatum* and *P. trichomanoides*, but separable from them by the dentately lobed pinnæ; still nearer *Polypodium glandulosum* (Hoox. Sp. Fil. IV. p. 193, t. 276), from which our plant is distinguishable in having much narrower and much remoter pinnæ of very much thinner texture, and by the absence of glandular hairs.

Cyclophorus Desy.

Cyclophorus grandissimus Hayata sp. nov. (Fig. 179). Niphobolus grandissimus Hayata Herb. Taihoku. Epiphytica. Rhizoma repens subteres 8 mm. in diametro squamis dense obtectum, squamis lanceolato-linearibus usque 7 mm. longis basi usque 1½ mm. latis stramineo-castaneis. Stipes 40 cm. longus glaber complanato-teres vel tetragonus supra planus latere sulcatus castaneo-stramineus. Frons 40 cm. longa 8 cm. lata lanceolata apice acuminata supra medium usque ad basin æquilata sursum abrupte acuminata basi leviter auriculato-dilatata basi fere truncata margine subintegra vel obscure repanda facie plana ad basin undulata pagine supra glabra subtus dense stellato-tomentosa, costis supra planis subtus elevatis, venis lateralibus tenuis-

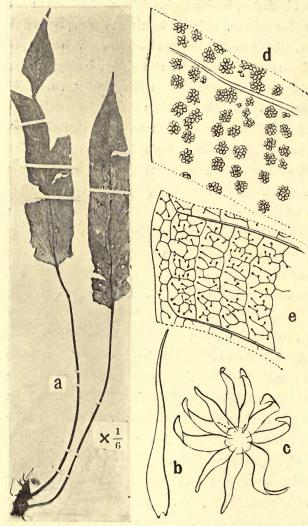


Fig. 179, Cyclophorus grandissimus HAYATA; a, the plant; b, a scale on the rhizome; c, a stellate hair on the frond; d, a portion of the frond, showing sori; e, the same, showing venation.

simis utraque pagine distincte visis a cota 50° divaricatis rectis mediis a se 8 mm. remotis; pagina supra atro-viridissima subtus dense ferrugineoalbescenti dense sorifera sed ad venas laterales non sorifera.

HAB. Arisan, leg. B. HAYATA et S. SASAKI, Jan., 1912.

Near Niphobolus lingua and N. costata (WALL.) BEDD. Fern. Brit. Ind. t. 120, but differs from them by the very much longer stipes and larger fronds with undulate margin and abruptly truncate somewhat auriculate base.

Cyclophorus transmorrisonensis HAYATA sp. nov. (Fig. 180). Rhizoma breve suberectum? apice squamis dense obtectum, squamis lanceolatis $2\frac{1}{2}$ mm. latis acuminatis. basi latioribus

cordatis margine ciliato-fimbriatis. Stipes 1 cm. longus non squamatus obscure subalatus dense pilosus, pilis stellatis. Frons lanceolata 3–5 cm. longa crassiuscula primum utraque pagine densissime stellato-pilosa demum supra dense vel parce pilosa subtus semper densissime pilosa supra parce

depresso-punctata apice attenuato-obtusa vel obtusa basi gradatim attenuata margine integra exsiccato vel humido superne recurvo-revoluta subtus dense sorifera; costa utraque pagine non visa. Sori rotundati minus 1 mm. in diametro irregulariter dense approximatim dispositi.

Hab. Montibus centralibus, ad 10000 ped. alt., leg. U. Mori, 1906, (No. 2363).

Niphobolus transmorrisonensis HAYATA in sched. herb. Taihoku.

Niphobolus fissus Hayata Mater. Fl. Formos. p. 448 (non Blume). Near N. fissus Blume, but differs from it by the fronds which are pilose on both sides.

Elaphoglossum Schott.

Elaphoglossum conforme Moore; Bedd. Fern. South Ind. t. 198 et Handb. Fern. Brit. Ind. p. 416 fig. 247.

HAB. Arisan, 6000-7000 ped. alt., B.HAYATA et S. SASAKI, Jan., 1912.



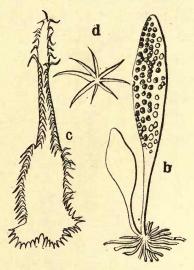
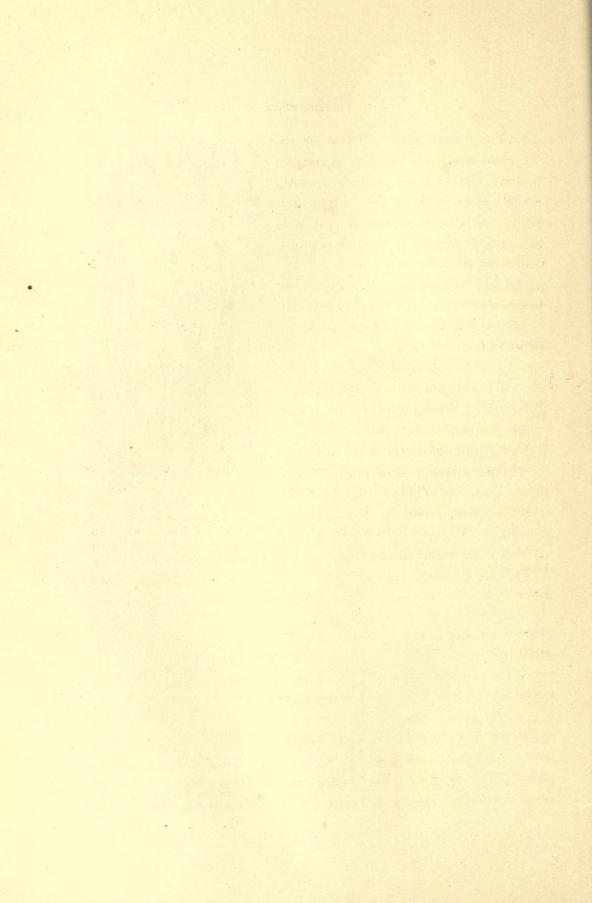


Fig. 18O, Cyclophorus transmorrisonensis HAYATA; a, the plant, (reduced); b, the same; c, a scale on the rhizome; d, a stellate hair on the frond; b, natural size.



Orlers in capital type; species in roman type; genera, synonyms and species incidentally mentioned in italic type.

Acacia Will 4	Asplenium Mertensianum Kze 232
" confusa Merrill var. Inamurai	" morrisonense Hayata 225
Начата 4	" pekinense Hance 229
Acanthephippium 63	,, planicaule Wall 226
Aconitum Linn	" prolongatum Hook 227
" Fukutomei HAYATA 1	,, resectum Sm. form. adiantifrons. 226
" sachalinense F. Schimidt 2	" rutæfolium Kunze 227
Actinidia Lindl 2	" scolopendrifrons HAYATA 227
" callosa Lindl. var. for-	" scolopendrioides J. Sm 228
mosana Finet et Gagn 2	" tenuicaule Hayata 228
" Championi HAYATA 2	" tenuissimum Hayata 229
Adenia formosana HAYATA 8	" tozanense Hayata 236
Ailanthus Desf 2	" unilaterale Lam. var. obliquis-
" glandulosa Desf. var. Tana-	simum HAYATA 230
kai Начата 2	" viridissimum Hayata 231
Anactochilus Blume 99	" Wrightii Eat. var. aristato-
" bisaccatus Hayata 99	serrulatum Hayata 232
,, formosanus Hayata 101	Athyrium Rотн 233
" grandiflorus Lindl 104	,, adiantum nigrum (Linn.) 221
" Inabai Науата 102	" erythropodum Hayata 233
" koshunensis Hayata 104	" macrocarpum Bl 234
,, lanceolatus Lindl 101	" reflexipinnum Hayata 234
" Roxburghii Lindl 102	,, rigescens Makino 220
Arisanorchis Hayata 109	" subrigescens Hayata: 219
" Такеоі Науата 110	tozanense Hayata 235
Aspidium Sw 188	Beilschmiedia Nees 20
" Lonchitis Lowe 196	,, erythrophloia Hayata. 20
" submembranaceum Hayata. 188	Blechnum Linn 236
" subtriphyllum Hook 189	" integripinnum HAYATA 236
Asplenium Linn	Boschniakia C. A. Mey 19
" adiantum nigrum Linn 221	" Kawakamii Hayata 19
" affine Sw 232	,, himalaica Hk. f. et Th. 19
" apoense Copeland 214	Botrychium Sw 134
" caducum Wall 197	" leptostachyum HAYATA 134
" ensiforme Wall 214	" virginianum Sw 135
" iridiphyllum Hayata 223	Bulbophyllum Thou 45
" laserpitiifolium Lam. var.	" affine Lindl 49
morrisonense Hayata 225	" flavisepalum Hayata 45
" lasiniatum Don 224	" gracillimum Hayata 46
" Макіпоі Начата 224	" Inabai Науата 47
" Matsumuræ Christ 225	,, kusukusense Hayata 48

Bulbophyllum melanoglossum HAYATA	49	Cornus macrophylla Matsum 12
omerandrum Hayata	50	Cormis macrophyua MATSUM
uraiense Hayata	50	
viridiflorum HAYATA	51	77 41 74 75
0 -	65	0
	65	1 11 1 11
		777 711 7 14
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	65	
" caudatilabella HAYATA	66	Cryptostylis R. Br 117
" forsythiiflora HAYATA	67	" erythroglossa Hayata 117
graciliflora Hayata	68	" filiformis (Blume) 118
" Henryi Rolfe	69	Cyclophorus Desv 255
" herbacea Lindl	66	" grandissimus Hayata 255
" Kawakamii Hayata	69	" transmorrisonensis Hayata 256
" lamellata HAYATA	70	Cymbidium Sw 74
" reflexa Maxim	71	" albo - jucundissimum HAYATA. ·74
" Sasakii Hayata	71	" aloifolium Swartz 74
CAPRIFOLIACEÆ	12	" arrogans Начата 76
Cephalotaxus Zucc	22	" ensifolium Sw 77
,, drupacea S. et Z	22	" formosanum Hayata 77
, Wilsoniana HAYATA	22	" lancifolium Hook 79
Cestichis dolichopoda HAYATA	27	" Mackinnoni Duthie 78
" Somai Hayata	33	,, lcanran Mak 82
Cheirostylis Blume	108	" illiberale HAYATA 78
, chinensis	109	
" Inabai Hayata	108	oncontilum U.v.m. 90
and the second second	17	Por Do
	20	" Promoved hismals Haven 91
		" True t D 00
Towns and the second of the second	21	
" pseudo-loureirii HAYATA	20	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Cirrhopetalum boninense Makino	51	" virens LINDL 78
" flavisepalum HAYATA	46	Cystopteris Bernhard 143
" Inabai HAYATA	47	" formosana Hayata 143
" melanoglossum Hayata	49	,, fragilis Bernh 146
" omerandrum Hayata	50	" japonica Leurs 144
" uraiense Hayata	51	" sphærocarpa Hayata 144
Cleisostoma Blume	95	Davallia Sm 204
" brachybotrya Hayata	95	" platyphylla Don 209
" ionosma Lindl	96	" stenolepis Hayata 204
" oblongisepala HAYATA	96	Dendrobium Sw 36
" taiwaniana Hayata	98	" biflorum SWARTZ 40
CONIFERÆ	22	,, candidum Wall 41
Coniogramme Fée	237	" erythroglossum HAYATA 36
" fraxinea Fée	239	,. fimbriatolabellum HAYATA 38
" parvipinnula HAYATA	237	,, furcatopedicellatum HAYATA 39
Coelogyne formosana HAYATA	64	,, heishanense HAYATA 40
CORNACEÆ	11	, kwashotense Hayata 41
Cornus Linn	11	" leptocladum Hayata 43
Transaction of the same of the	12	1
" controversa HEMSL	11	moniliformo Sur 44
", iongripulum mainia	11	" monintorme bw 42

Dendrobium pendulicaule HAYATA 44	Dryopteris Maximowiczii 175
" subclausum Rolfe 44	" melanocarpa Науата 163
" tenuicaule Hayata 43	" Miqueliana С. Он 174
" Victoria-regince Lohen 44	" morrisonensis Hayata 166
Desmotrichum fimbriatolabellum HAYATA 38	" nigrisquama HAYATA 167
DIAPENSIACEÆ 17	" ochthodes C. CH 167
Didymoplexis Griff 119	., pachyphylla HAYATA 168
" subcampanulata HAYATA 119	" podophylla 172
" pallens Griff 120	" phæolepis Начата 169
Diplazium Sw 212	" prolifera С. Сн 170
" arisanense Hayata 212	" pseudosieboldii Hayata 171
" bicuspe Начата 214	
" costalisorum Hayata 213	
" isobasis Christ 214	" reflexosquamata HAYATA 176
" Каwакатіі Науата 215	" remota Науата 177
" leiopodum Hayata 217	" serrato-dentata (BEDD.) HAYATA 179
" Makinoi Yabe 224	" Sieboldii 172
" tenuicaule HAYATA 220	" sophoroides O. Ktze. form.
" subrigescens Hayata 219	ensipinna 180
" Textori (Mrq.)	" spinulosa O. Ktze. var. mor-
Diploprora Hook. f	
Chammioni 077	" squamæstipes C. Ch 179
, kusukusensis Hayata 86	1111 17
or	1 11 1 0 0
Dryopteris Adanson	11 77 400
of-icome C C- 107	
amoratadiameta H.v 140	11 the 1-1th II
aminiflama O. W. 147	17 17 100
Politomoi O Vman 151	
	", Yabei Hayata 187
	Etaphoglossum Schott 257
" eyrtolepis Hayata 149	", conforme Moore 257
, decipiens 167	
" Eatoni (Bak.) 150	" arisanensis Hayata 54
" Filix mas var. serrato-den-	" hypomelana HAYATA 54
tata Bedd 179	" japonica Max 54
" fluvialis Hayata 152	., plicatilabella HAYATA 55
" gracilescens O. Ktze 151	, reptans Mr
" hirtipes O. Ktze 152	" septemlamella Hayata 56
" hypophlebia Hayata 154	" tomentiflora HAYATA 56
" Kawakamii Hayata 155	
" Кодата Начата 156	EULOPHIA R. Br
" kusukusensis Hayata 157	" brachycentra Hayata 72
" lævifrons Hayata 158	" herbacea Lindl 73
" lepidopoda Hayata 161	" ramosa Hayata 73
" leptorhachia Hayata 162	Galera Blume 121
" leucostipes (Baker) C, Ch. 163	" kusukusensis Hayata 121
" membranoides HAYATA 165	" Rolfei Начата 121

Goodyera R. Br 111	Ione intermedia King et Pantling 53
" bilamellata Hayata 111	", Sasakii Hayata 52
" caudatilabella Hayata 112	Lastrea apiciflora (Hook.) Bedd 147
" cyrtoglossa HAYATA 113	LAURINEÆ 20
" foliosa Benth 115	LEGUMINOSÆ 4
" Henryi Rolfe 117	Leucostegia Presi 205
" longibracteata Hayata 114	" parvipinnula Hayata 205
" longirostrata HAYATA 115	Lindsaya Dry 211
" morrisonicola Hayata 116	" kusukusensis Hayata 211
, pachyglossa Hayata 117	Liparis Rich 27
" procera 113	" congesta 34
Gossypium Lann 21	" dolichopoda Hayata 27
" hirsutum var. religiosum Watt. 2	" Каwakamii Науата 28
Gymnogramme aurita Hook 149	" Henryi Rolfe 33
Gymnopteris Bernh 201	" longipes Schlecht 27
,, dichotomophlebia HAYATA 201	" macrantha Rolfe 28
" variabilis (Bedd.) 202	" Nakaharai Науата 29
Habenaria WILLD 126	" platybolba HAYATA 30
" aristata Ноок. f 125	" Sasakii Hayata 32
" ciliolaris Kränzl 128	" Somai Начата 33
" goodyeroides Don var.	" taiwaniana Hayata 34
formosana Hayata 126	" Uchiyama Schlecht 35
" goodyeroides HAYATA 126	Luisia GAUD 85
" longitentaculata HAYATA 127	" liukiuensis Schlecht 80
" linearipetala Hayata 126	" megasepala Начата 85
" Miersiana Champ 129	,, teres BL
" stenopetala Lindl 127	LYCOPODIACEÆ 130
" stenopetala Lindl. var.	Lycopodium Linn 130
polytricha Hook. f 128	" alpinum Linn. var. trans-
tohoensis Hayata 128	morrisonense Hayata 13
HAMAMELIDEÆ 6	carinatum Desv 131
Hemipilia Lindl	" cunninghamioides HAYATA 131
formosana Hayata 129	., cryptomerinum Max 132
Humata grandissima Hayata 209	" formosanum W. Herter 131
HYDROCHARIDEÆ 23	" juniperistachyum HAYATA 132
Hudrocharis Linn 23	" pinifolium Hayata 133
asiatica Mrq 23	" pulcherrimum Wall 132
HYMENOPHYLLACEÆ 135	" Selago Linn
Hymenophyllum Linn 140	" serratum TH var. myrio-
" constrictum HAYATA 140	phyllifolium HAYATA 133
" javanicum Spreng 141	squarrosum Forst 135
parallelocarpum HAYATA 141	" subdistichum Makino 135
polyanthos Sw 142	;, taxifolium Hayata 132
,, rarum R. Br 142	" taxifolium Hayata 138
" Wrightii V. D. Bosch 142	, tereticanle Hayata 133
Hypodematium Rüppellianum Kunze 149	MALVACEÆ 2
<i>Hypolepis</i> Bernh 239	Microlepia Prest 207
" tenuifolia Bernh 239	" grandissima Hayata 207
Ione Lindl	" quadripinnata Hayata 17
	, , , , , , , , , , , , , , , , , , , ,

Microlepia subpinnata HAYATA 20	09 <i>Physurus</i> Rich
" trichocarpa Hayata 21	10 , chinensis Rolfe 99
Modecca LAM	8 Plagiogyria Mett 239
" formosana Hayata	8 , adnata Bedd 239
Moneses Salisb	17 ,. euphlebia Метт 239
" rhombifolia A. Andres 1	17 ,, falcata Copel 239
Nephrodium odoratum BAKER 14	49 , Hayateana Makino 239
	1 , Matsumuræ Hayata 239
	02 stenoptera Diels 239
	02 Platanthera Rich 129
Nervilia GAUD 11	18 , goodyeroides var. for-
	18 тозапа Начата 126
	18 , longibracteata HAYATA 122
Niphobolus costatus (Wall.) 25	
" fissus Начата 25	
" grandissimus HAYATA 25	
,, Lingua 25	
" transmorrisonensis Hayata 25	
0 "	23 , sp. (Fig. 66.) 125
anisamanaia II	23 Pleione Don
1.21-14-1-111- TT 0	23 , formosana Hayata 64
f TT	25 Pleopeltis rostrata Hook
	hemionitidea Moore 250
	99 Pogonia Scottii Reichb
grandyflorus Benth 10	
" Inabai Hayata 10	
,	
	71 77
OPHIOGLOSSACEÆ 13	
Oreorchis	
" Fargesii Finet var. subca	nifrons Hayata 245
	35 ., falcatopinnatum Hayata 247
	g ,, formosanum Baker 245
OSMUNDACEÆ	
Osmunda Linn 13	
" regalis Linn. var.? 13	
	n lineare Thung, var. moniliso-
	8 rum Hayata 248
	меyenianum (Schott) Hook. 249
" 8	morrisonense Hayata 250
	obtusifrons Hayata 250
,,	9 , Oncei Fr. et Sav 251
	94 ,, • pellucidifolium HAYATA 250
	y pseudotrichomanoides Hayata 251
"	gen guasipinnatum Hayata 253
	9 ,, rostratum Hook 253
	8 , Thwaitesii Bedd 247
Phreatia nebularis 59	
" saccifera 5	9 <i>Polystichum</i> Вотн 190

Polystichum aculeatum Roth 190	Saccolabium Somai HAYATA 93
" atroviridissimum HAYATA 190	Sarcanthus Lindl 94
" constantissimum Hayata 191	" fuscomaculatus HAYATA 94
" falcatipinnum HAYATA 192	" taiwanianus Hayata 98
" globisorum Науата 193	SELAGINELLACEÆ 123
" horridipinnum Hayata 195	Selaginella Spring 129
" ilicifolium Don 196	" leptophylla 130
" integripinnum HAYATA 196	" stenostachya Hayata 120
" laserpitiifolium 195	Shortia Torr. et Gr 17
,, lonchitoides (Christ) 157	" exappendiculata HAYATA 18
" prionolepis Hayata 197	,, ritoensis HAYATA 17
" rectipinnum HAYATA 199	Shortiopsis exappendiculata Hayata 18
" tenuissimum Hayata 254	" ritoensis Hayata 17
" transmorrisonense Hayata 187	SIMARUBEÆ 2
" Tsus-Simene J. Sm 201	Stauropsis luchuensis Rolfe 96
Pteris Linn	Tainia Blume 61
,, biaurita Linn	" cordifolia Hook 61
" excelsissima Hayata 239	" Fauriei Schlecht 61
,, dactylina Ноок 239	" unguiculata HAYATA 61
" excelsa Gaud 241	Tainiopsis unguiculata HAYATA 61
,, pellucida Pr 241	TERNSTRŒMIACEÆ 2
" setuloso-castulata HAYATA 241	Trichomanes Sm 135
" tripartita Sw 242	" acuto-obtusum HAYATA 135
Quercus Linn 21	" acutum Makino 139
" Cornei 21	" bipunctatum Poir.; 137
" kodaihoensis Hayata 21	" cupressifolium Hayata 136
" Konishii Hayata 21	" filiculum Bory 137
" stenophylloides Hayata 21	" humile Forst 138
" stenophylla Mk.; 22	, humile Forst 137
RANUNCULACEÆ 1	,, japonicum Fr. et Sav. 138
RHAMNEÆ 3	" Makinoi С. Сн 139
Rhamnus Linn 3	" maximum Blume 138
" acuminatifolia Hayata 3	" nanum 136
Rhododendron Linn 15	" orientale С. Сн 138
" ellipticum Maxim 16	" palmifolium HAYATA 138
" leiopodum Hayata 16	" rigidum Sw.; 140
" Тапакаі Науата 15	" thysanostomum Hayata 138
ROSACEÆ	Viburnum Linn 12
Rubus Linn	" arboricolum Hayata 12
" glandulosopunctatus HAYATA 5	" furcatum; Blume 14
" rosæfolius var. Maximowiczii Focke 6	" melanophyllum HAYATA 13
Saccolabium Blume 88	,, odoratissimum Ker 13
" formosanum Hayata 88	" propinquum Hemsl 14
" fuscopunctatum Hayata 89	Vittaria Sm 243
" japonicum Max 89	" arisanensis HAYATA 243
" Matsuran Makino 90	Zeuxine Lindl 106
" quasipinifolium HAYATA 90	" arisanensis Hayata" 106
" retrocallum Hayata 92	" reflexa King et Pantling 107

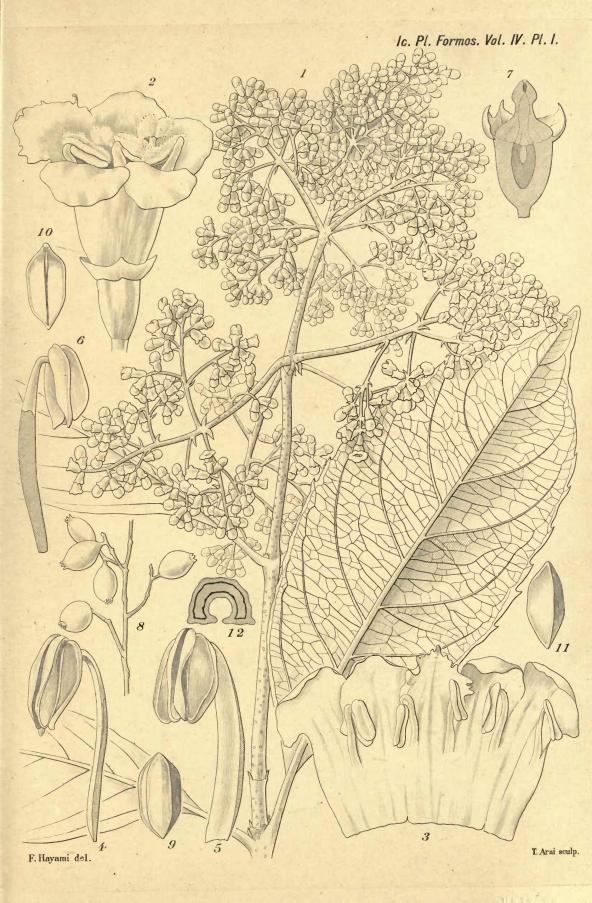
ICONES PLANTARUM FORMOSANARUM.

PLATE I.

Explanation of Pl. I.

Viburnum arboricolum HAYATA.

- Fig. 1. A branch.
 - 2. A flower.
 - 3. Corolla, expanded.
 - 4. 5. 6. Stamens, seen from different sides.
 - 7. An ovary in vertical section.
 - 8. Fruits.
 - 9. 10. 11. Putamens, seen from different sides.
 - 12. Cross section of a putamen.



ICONES PLANTARUM FORMOSANARUM. IV.

PLATE II.

Explanation of Pl. II.

Viburnum melanophyllum HAYATA.

Fig. 1. A branch.

- 2. A stellate hair on a leaf.
- 3. Corolla of a margin flower.
- 4. A fertile flower.
- 5. Corolla of the same.
- 6. An ovary with calyx and an ovoid style.
- 7. Stamens, seen from different sides.



F. Hayami del.

T.Arai sculp

ICONES PLANTARUM FORMOSANARUM.

PLATE III.

Explanation of Pl. III.

Viburnum propinquum HEMSL.

Fig. 1. A branch.

- 2. A flower.
- 3. Corolla expanded.
- 4. A stamen.
- 5. Calyx and style.



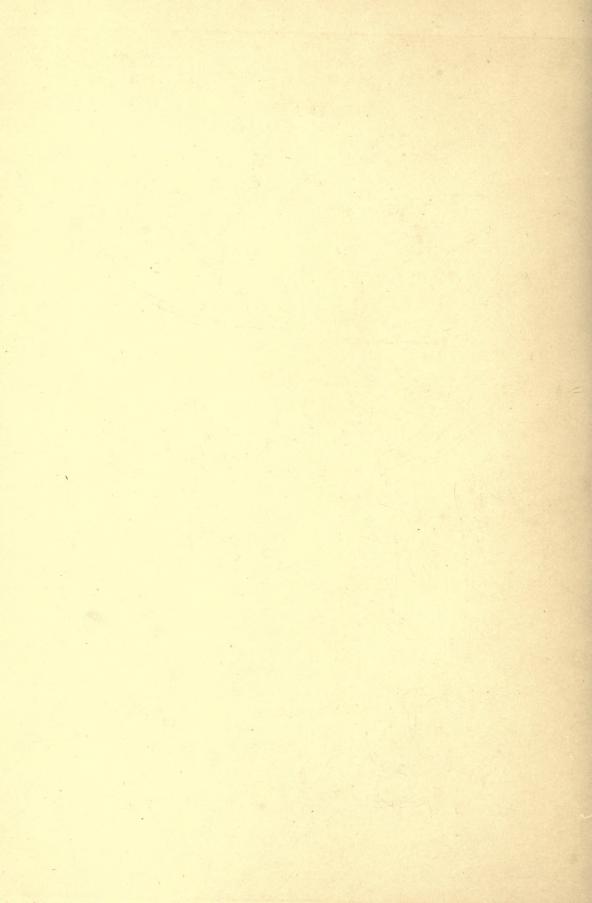


PLATE IV.

Explanation of Pl. IV.

Quercus kodaihoensis HAYATA.

.VI ...IA.

Fig. 1. A branch.

- 2. A leaf.
- 3. A fruit.
- 4. A glans.



ICONES PLANTARUM FORMOSANARUM. IV.

PLATE V.

Explanation of Pl. V.

Liparis dolichopoda HAYATA.

- Fig. 1. The plants in the habitat, (reduced).
 - 2. The plant.
 - 3. A part of inflorescence.
 - 4. A flower.
 - 5. A lip, seen from front.
 - 6. The same, seen from back.
 - 7. The same, showing its apex.
 - 8. The same, seen from side.
 - 9. Apical portion of the same, very much magnified.
 - 10. A column, seen from face.
 - 11. The same, seen from side.
 - 12. The same, in section.
 - 13. An anther, seen from back.
 - 14, 15. A pollinium, seen from different sides.

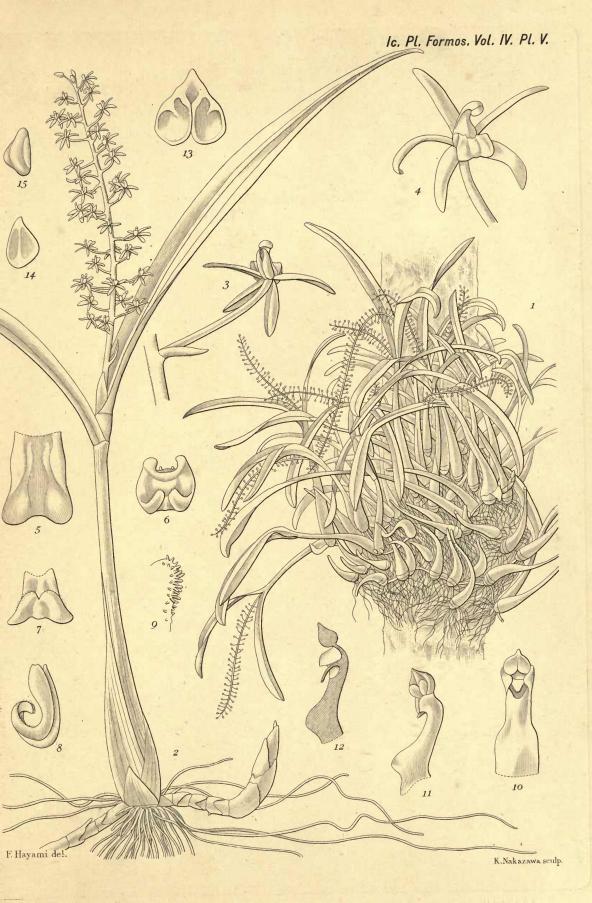


PLATE VI.

Explanation of Pl. VI.

Liparis Somai HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. The same, seen from side.
 - 4. A dorsal sepal.
 - 5. A lateral sepal.
 - 6. A petal.
 - 7, 8, 9. A lip, seen from different sides.
 - 10. A column.
 - 11. The same, in section, seen from side.

K. Nakazawa sculp.

F. Hayami del.

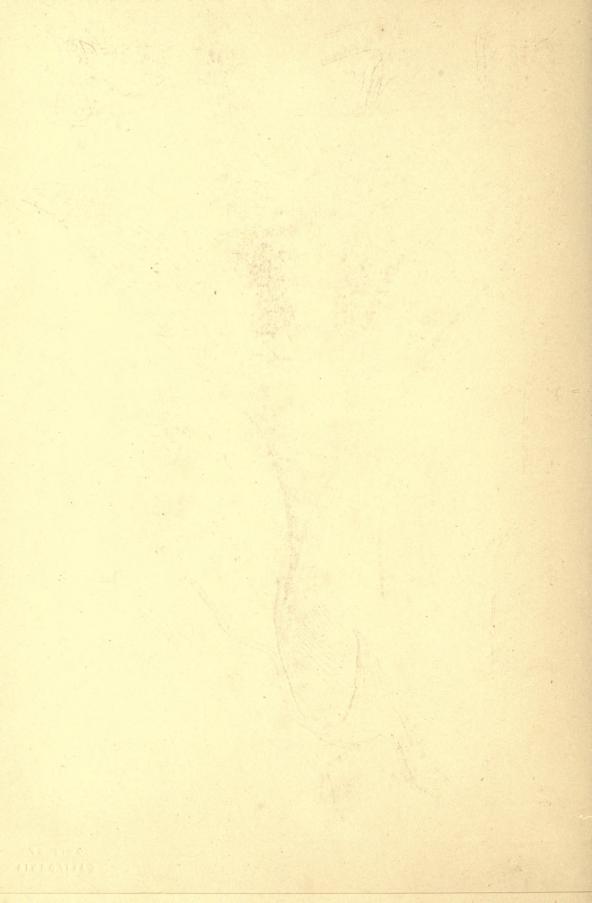


PLATE VII.

Explanation of Pl. VII.

Liparis taiwaniana HAYATA.

Fig. 1. The plant.

A. Farmes of W. Fi. Id.

- 2. A part of inflorescence.
- 3. A flower.
- 4. A dorsal sepal.
- 5. A lateral sepal.
- 6. A petal.
- 7, 8, 9. A lip, seen from different sides.
- 10. Column, seen from front.
- 11. The same, seen from side.
- 12. An anther, lifted from the column.
- 13. The same, seen from back.
- 14. Pollinia.
- 15, 16. Pollinium, seen from different sides.





PLATE VIII.

Explanation of Pl. VIII.

Dendrobium longicalcaratum HAYATA.

- Fig. 1. The plant.
 - 2. A flower, seen from face, lip taken aside.
 - 3. The same, seen from back.
 - 4. The same, seen from front, spur partially taken off to show the column and mentum.
 - 5. A dorsal sepal.
 - 6. A lateral sepal detached from the mentum.
 - 7. A petal.
 - 8. A lip, seen from within.
 - 9. A portion between the claw and lamina of the lip, seen from back.
 - 10. Column, seen from side.
 - 11. The same, seen from back.
 - 12. The same, in section, seen from side.
 - 13. The same, seen from back.
 - 14. An anther with a gland.
 - 15. The same, seen from back, pollinia taken off.
 - 16. The same, with pollinia.
 - 17. Pollinia.
 - 18. The same, seen from below.

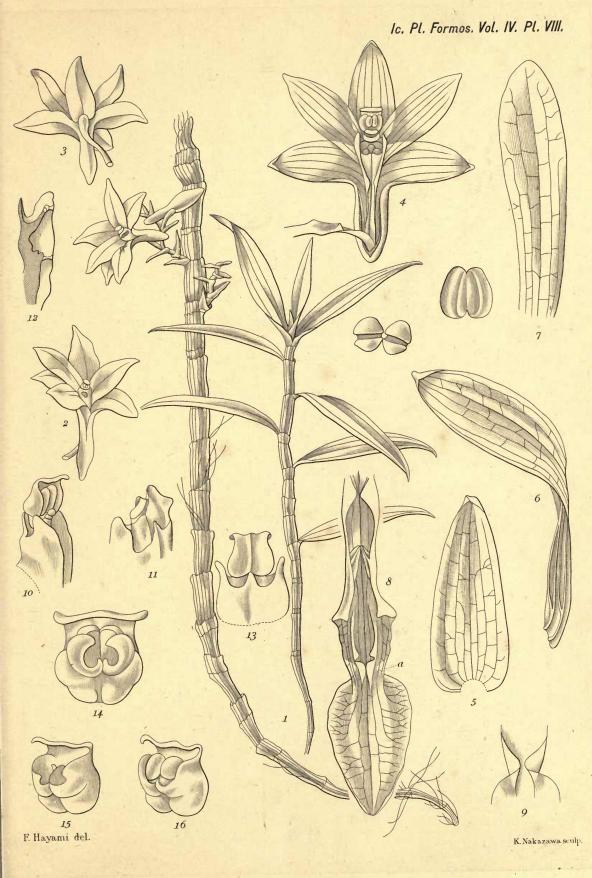
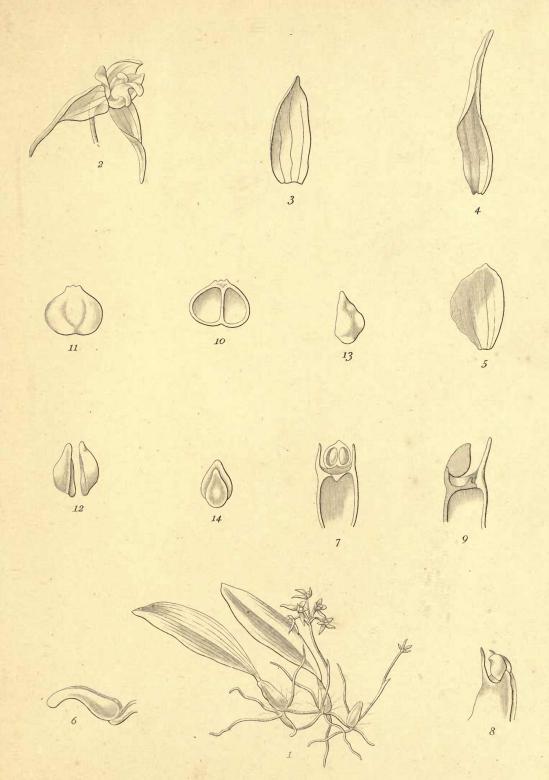


PLATE IX.

Explanation of Pl. IX.

Bulbophyllum Inabai HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. A dorsal sepal.
 - 4. A lateral sepal.
 - 5. A petal.
 - 6. Mentum and lip.
 - 7. Columna.
 - 8. The same, seen from back.
 - 9. The same, medially cut.
 - 10. An anther.
 - 11. The same, seen from back.
 - 12. Pollinia.
 - 13. A pollinium, seen from the outer side.
 - 14. The same, seen from the inner side.



F. Hayami del.

K. Nakazawa sculp.

PLATE X.

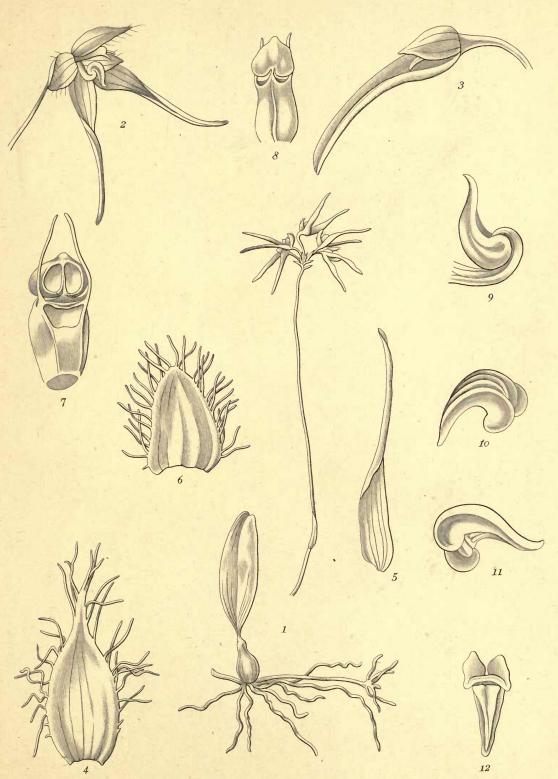
Jr. El Fandin, Vol. IV. El. K.

Explanation of Pl. X.

Bulbophyllium melanoglossum HAYATA.

Fig. 1. The plant.

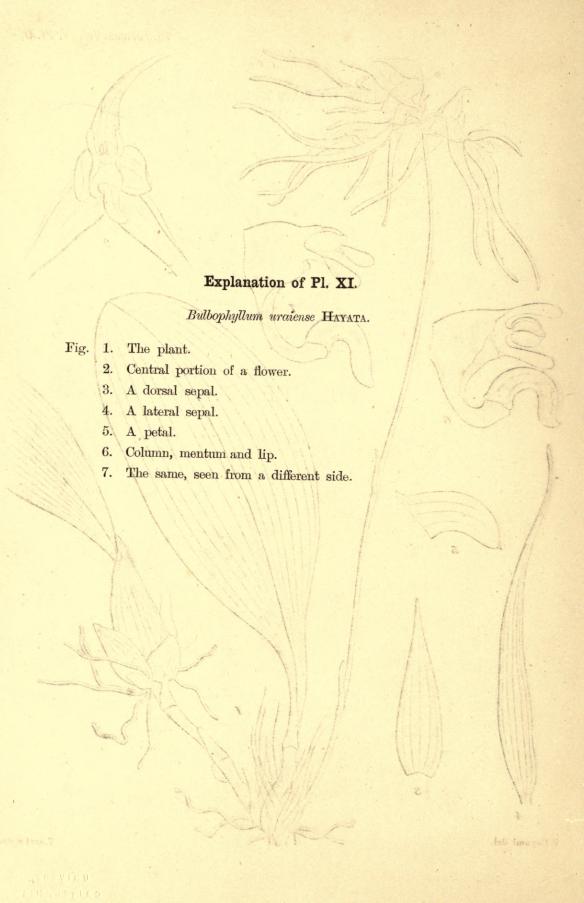
- 2. A flower (lateral sepals are artificially expanded).
- 3. The same, seen from side.
- 4. A dorsal sepal.
- 5. A lateral sepal.
- 6. A petal.
- 7. A column.
- 8. The same, seen from back.
- 9. 10. 11. 12. A lip, seen from different sides.

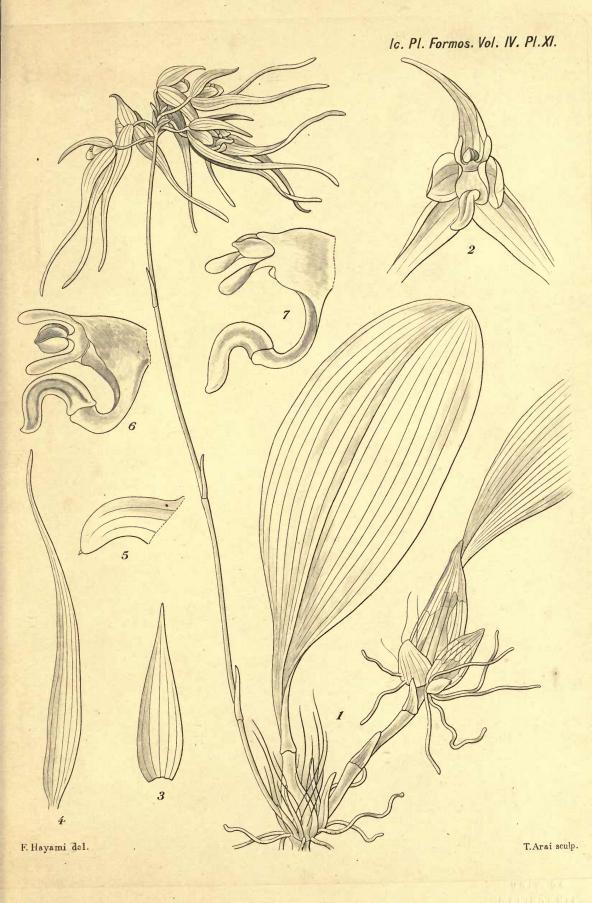


F. Hayami del.

K.Nakazawa sculp.

PLATE XI.





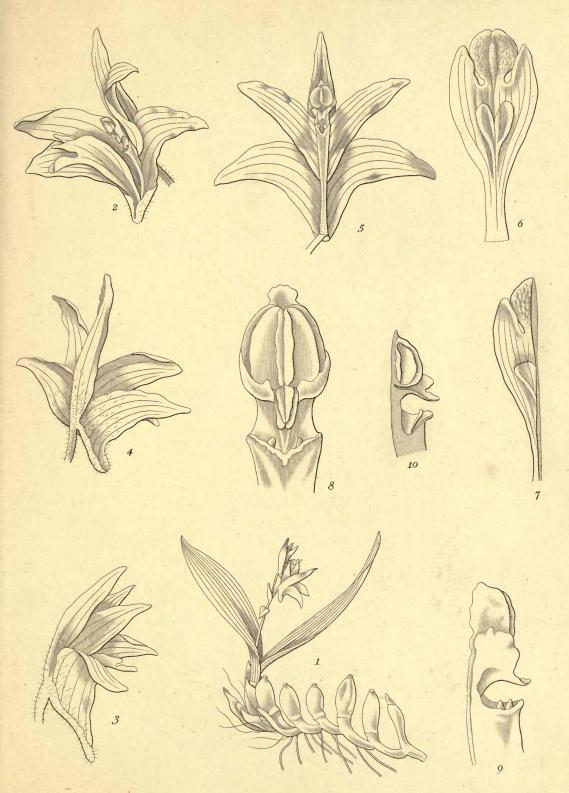
ICONES PLANTARUM FORMOSANARUM. IV.

PLATE XII.

Explanation of Pl. XII.

Eria arisanensis HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. The same, seen from side.
 - 4. The same, seen from back.
 - 5. The same, seen from face, lip taken off.
 - 6. A lip.
 - 7. The same, medially cut.
 - 8. Apical portion of a column.
 - 9. The same, seen from side.
 - 10. The same, in section.



ICONES PLANTARUM FORMOSANARUM. IV.

PLATE XIII.

Explanation of Pl. XIII.

Calanthe caudatilabella HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. A dorsal sepal.
 - 4. A lateral sepal.
 - 5. A petal.
 - 6. Column and lip.
 - 7. The same in section.
 - 8. The same, anther taken off.
 - 9. Rostellum, clinandrium and anther.
 - 10. 11. 12. Anther, seen from different sides.



ICONES PLANTARUM FORMOSANARUM. IV.

PLATE XIV.

Explanation of Pl. XIV.

Calanthe forsythiiflora HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. The same, seen from side.
 - 4. A petal.
 - 5. A lateral sepal.
 - 6. A flower, medially cut.
 - 7. The same flower, sepals and petals taken off, showing column and lip.
 - 8. A lip, spur medially cut and explicated.
 - 9. A spur.
 - 10. 11. 12. An anther, seen from different sides.
 - 13. 14. Pollinarium, seen from different sides.



CALIFORNIA

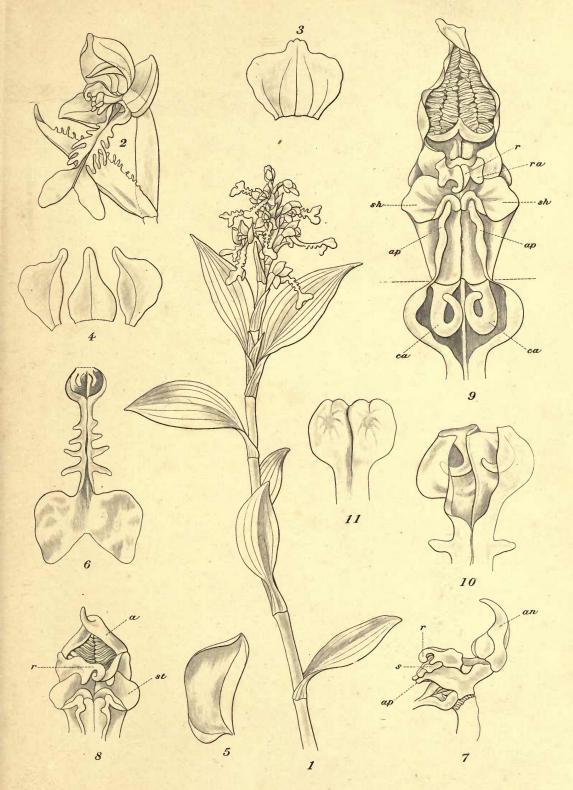
PLATE XV.

Explanation of Pl. XV.

Anæctochilus bisaccatus HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. A dorsal sepal and two petals forming a hood.
 - 4. The same, a dorsal sepal and petals detached.
 - 5. A lateral sepal.
 - 6. A lip.
 - 7. A column, seen from side, anther a little lifted.
 - 8. Apical portion of a column.
 - 9. The same column with the basal portion of the lip.
 - 10. Basal portion of the same lip.
 - 11. The same, seen from below.

r,=rostellum; st, sh, s=stigma; a, an=anther; ap=columnal appendages; ra,=lateral lobes of the clinandrium; ca=basal appendages of the lip.



F. Hayami del.

T. Arai sculp.

PLATE XVI.

Ic. Pt. Formus Vol. IV. Pt. XVI.

Explanation of Pl. XVI.

Anactochilus Inalai HAYATA.

Fig. 1.

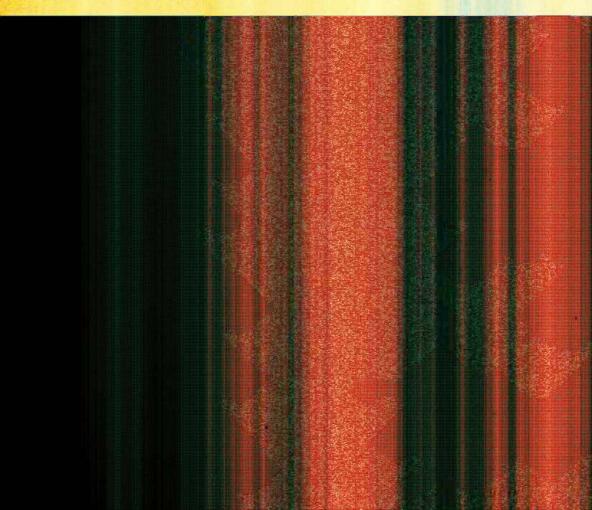
- 1. The plant.
- 2. A flower, seen from above.
- 3. The same, seen from below.
- 4'. A dorsal sepal and petals, forming a hood.
- 4. The same sepal and petals detached.
- 5. Two lateral sepals.
- 6. Central portion of a flower; an=anther, ap=columnal appendages; g=gland.
- 7. Apical portion of a column, anther taken off; c=clinandrium; r=rostellum; ap=columnal appendage.
- 8. An anther, seen from below; g=gland.



DELICITOR RESEARCE

ICONES PLANTARUM FORMOSANARUM.

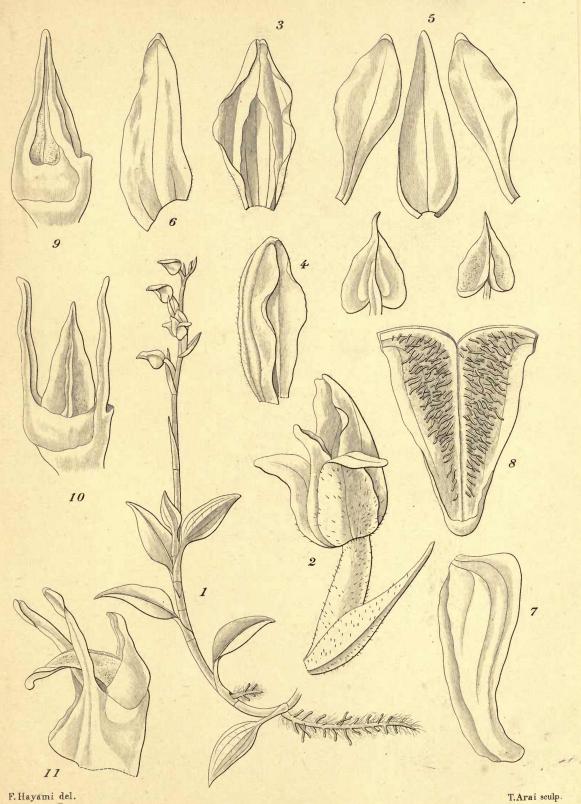
PLATE XVII.



Explanation of Pl. XVII.

Goodyera morrisonicola HAYATA.

- Fig. 1. The plant.
 - 2. A flower.
 - 3. A dorsal sepal and two petals forming a hood, seen from within.
 - 4. A dorsal sepal, seen from side.
 - 5. A dorsal sepal and two petals detached.
 - 6. A lateral sepal.
 - 7. A lip, seen from side.
 - 8. The same, explicated, seen from within.
 - 9. Column, seen from front.
 - 10. The same, rostellum expanded.
 - 11. The same, seen from side.
 - 12. An anther, seen from back.
 - 13. The same, seen from face.



FR081 V 20 D

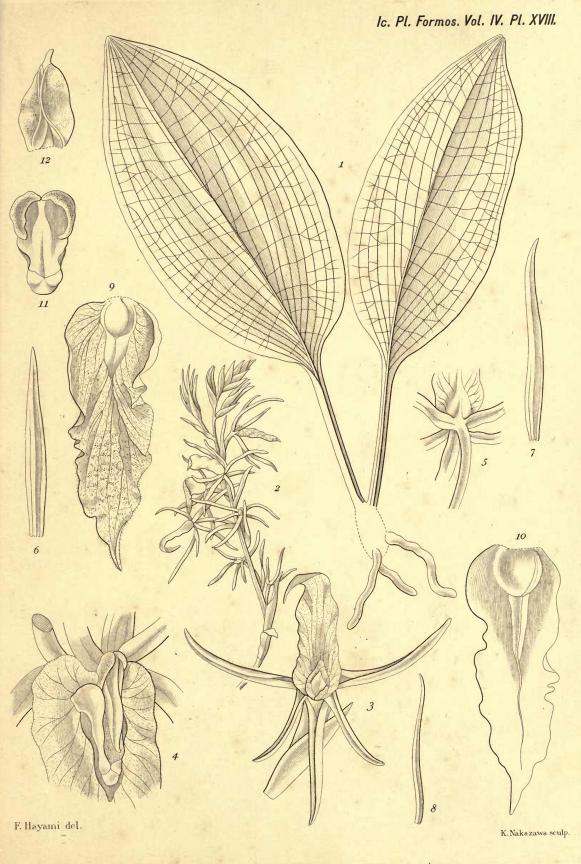
PLATE XVIII.

Explanation of Pl. XVIII.

Cryptostylis erythroglossa HAYATA.

Fig. 1. The plant.

- 2. Inflorescence.
- 3. A flower.
- 4. Central portion of a flower.
- 5. The same, seen from back.
- 6. A dorsal sepal.
- 7. A lateral sepal.
- 8. A petal.
- 9. A lip.
- 10. The same, seen from back.
- 11. A clinandrium.
- 12. An anther.



URIVACE CALIFORNIA

PLATE XIX.

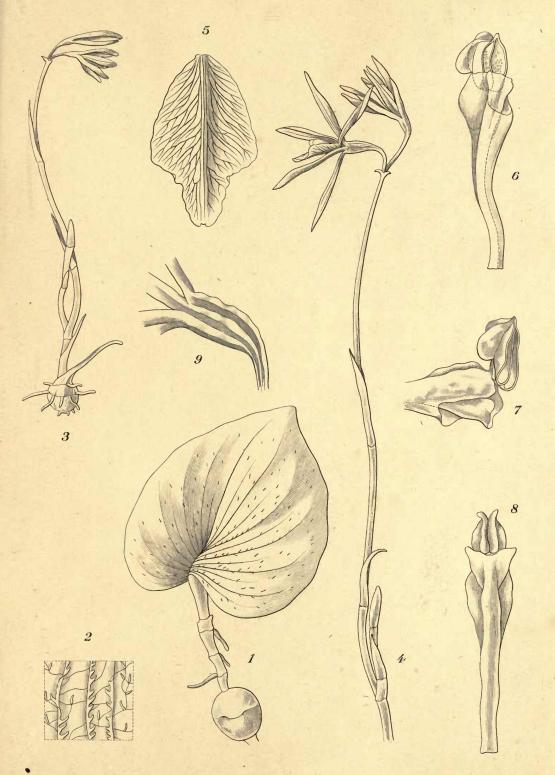
Explanation of Pl. XIX.

Nervilia purpurea (HAYATA).

- Fig. 1. The plant with a leaf.
 - 2. A portion of a leaf, showing lamellate hairs.
 - 3. The plant with a scape.
 - 4. Another scape.
 - 5. A lip.

P. French Tol. IV PLYTT

- 6. A column, seen from side.
- 7. Apical portion of the same, anther lifted.
- 8. A column, seen from back.
- 9. An ovary.



F. Hayami del.

T.Arai sculp.

PLATE XX.

Explanation of Pl. XX.

Galera kusukusensis HAYATA.

Fig. 1. The plant.

- 2. A scale on a rhachis.
- 3. A flower.
- 4. The same, segments expanded.
- 5. A dorsal sepal.
- 6. A petal.
- 7. lip, seen from face.
- 8. The same, seen from side.
- 9. A column and an anther, seen from side.
- 10. A column, anther taken off.
- 11. An anther.



K.Nakazawa sculp.

PLATE XXI.

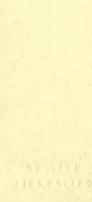
Explanation of Pl. XXI.

Platanthera pachyglossa HAYATA.

- 2. A flower.
- 3. The same, seen from side.
- 4. The same, seen from back.
- 5. Central portion of a flower.
- 6. The same in vertical section.
- 7. Column, seen from side.
 - 8. 9. Pollinarium, seen from different sides.



TENNITORNIA



Age

PLATE XXII.

Explanation of Pl. XXII.

Habenaria goodyeroides Don. var. formosana HAYATA.

- 2. A flower.
- 3. The same, seen from side.
- 4. The same, seen from back.
- 5. A dorsal sepal.
- 6. A lateral sepal.
- 7. A petal.
- 8. A lip.
- 9. 10. Pollinarium, seen from different sides.

F. Hayami del.



DRIV. OF SALIFORBIA

ICONES PLANTARUM FORMOSANARUM.

PLATE XXIII.

Explanation of Pl. XXIII.

Habenaria linearipetala HAYATA.

Fig. 1. The plant.

to Pr Leaves Vol. 1.

- 2. A flower.
- 3. A dorsal sepal.
- 4. A lateral sepal.
- 5. A petal.
- 6. A lip.
- 7. Central portion of a flower.
- 8. 9. A staminode, seen from different si les.
- 10. A stigma.
- 11. The same, seen from back.



XXW

ICONES PLANTARUM FORMOSANARUM.

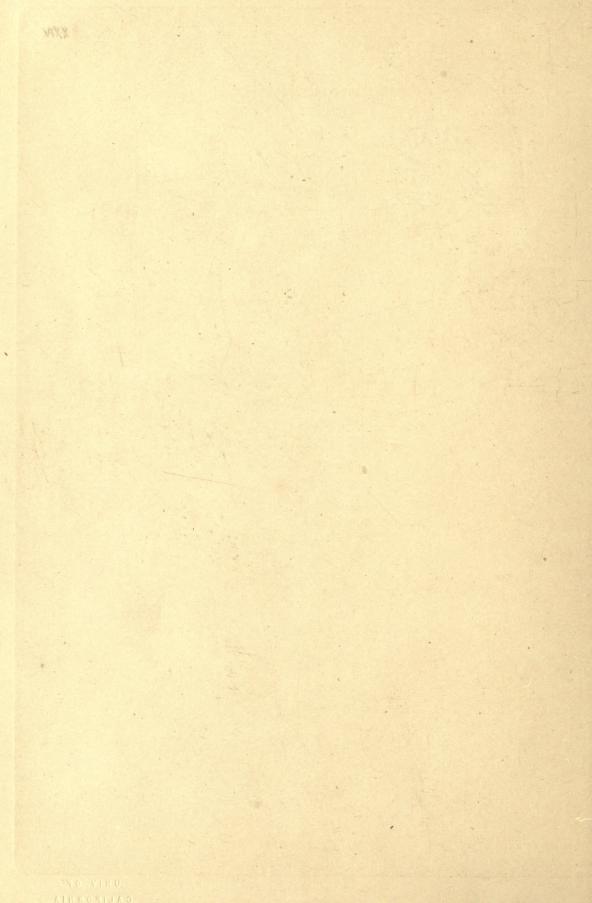
PLATE XXIV.

Explanation of Pl. XXIV.

Habenaria longitentaculata HAYATA.

- 2. A flower.
- 3. A dorsal sepal.
- 4. A lateral sepal.
- 5. 6. Lobes of a petal.
- 7. A lip.
- 8. central part of the flower.
- 9, 10. Staminodes.
- 11. Stigma.





ICONES PLANTARUM FORMOSANARUM.

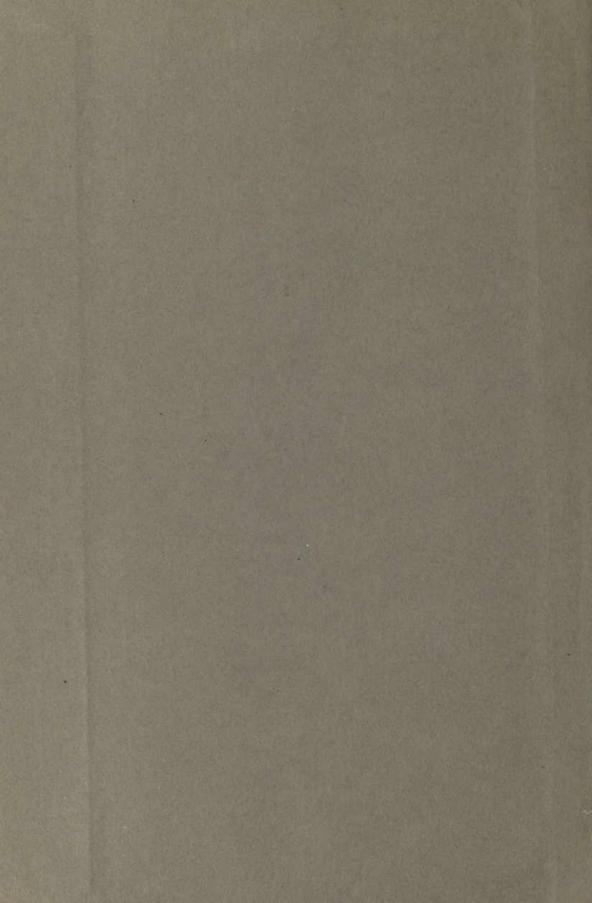
PLATE XXV.

Explanation of Pl. XXV.

Hemipilia formosana HAYATA.

- 2. A flower.
- 3. The same, seen from face.
- 4. A dorsal sepal.
- 5. A lateral sepal.
- 6. A petal.
- 7. A lip.
- 8. A column and lip, seen from side.
- 9. Apical portion of a column.
- 10. The same, seen from side.
- 11. The same, in section.
- 12. The same, seen from back.
- 13. 14. Pollinarium, seen from different sides.





大 大 E 正 三 \equiv 年 年 + _ _ + 月 月 + + 五 日 日 發 印 行 刷

編纂兼發行者 臺灣總督府民政部殖產局

印刷者島連

東京市神田區美土代町二丁目一番地

太

郎

東京市神田區美土代町二丁目一番地

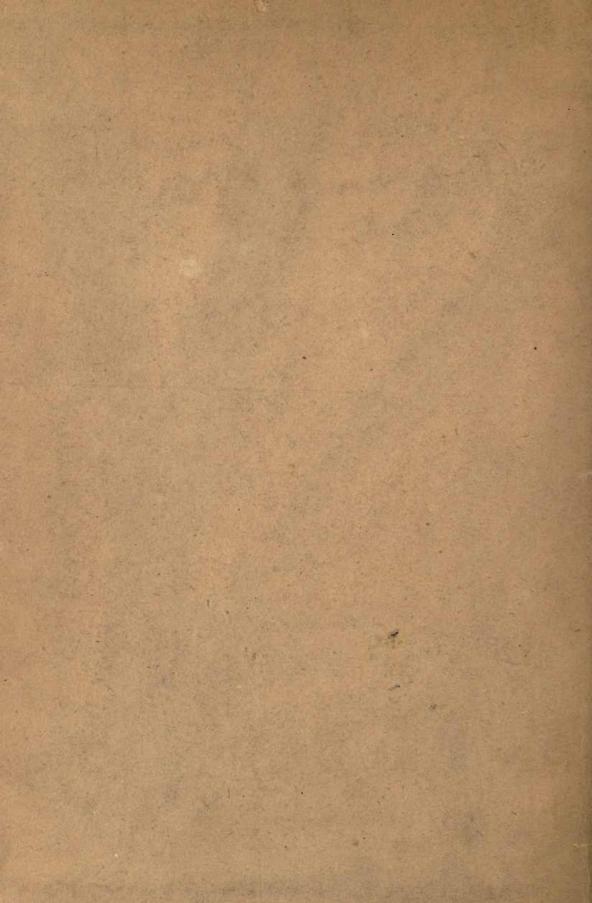
舍

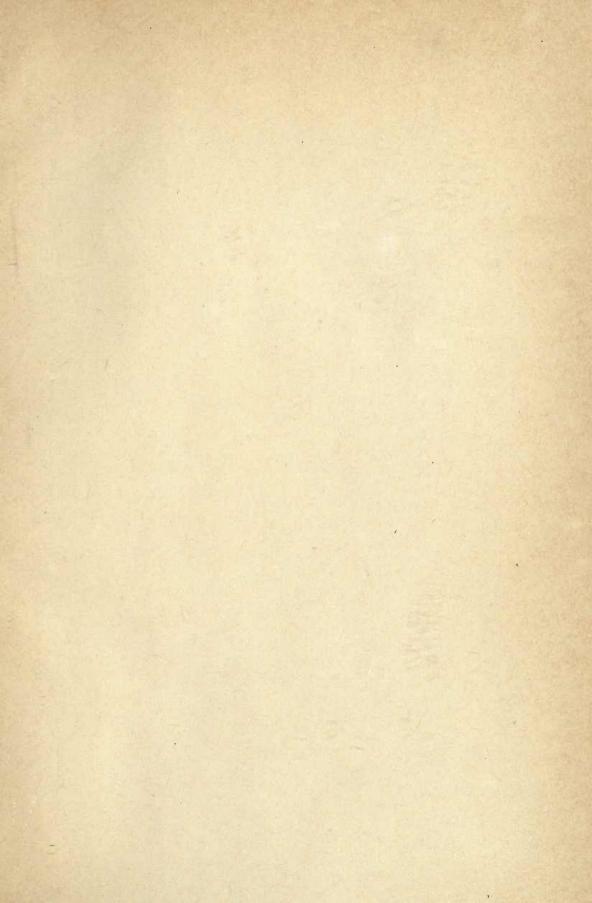
秀

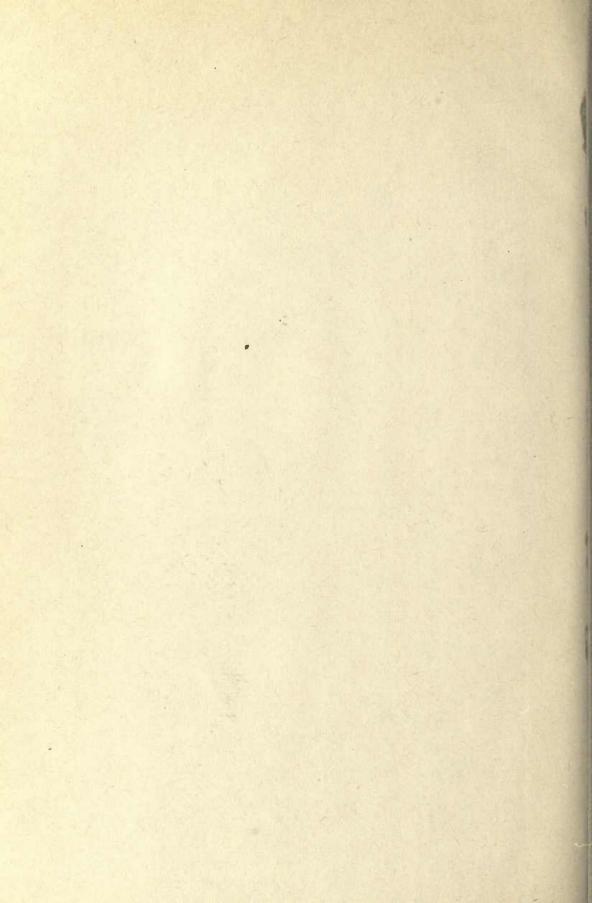
即

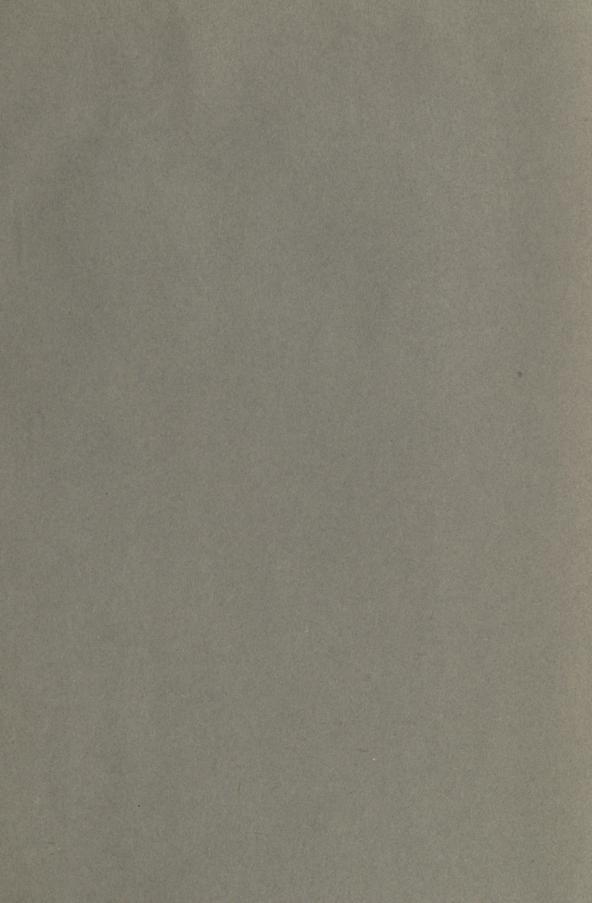
刷

所









UNIVERSITY OF CALIFORNIA LIBRARY BERKELEY

Return to East Asiatic Library.

DUE two weeks from last date stamped.

LD 21-5m-11,'50 (2877s16)476A



